OPTune™

The First "All-In-One" Hard-Disk Survival, Repair, and Tune-up Maintenance Utility.

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Now Supports
MS DOS™ 5.0
DR DOS™ 5.0

Important

DP13062891AB515

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Important!

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If No, will you be installing one in the future? ☐ Yes ☐ No
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Do you own a hard disk? ☐ Yes ☐ No How Large?______ CD ROM? ☐ Yes ☐ No
How do you back up data? ☐ Floppies ☐ Tape ☐ Removable disk ☐ Other ______
How many employees at your company?____________Computers? ____________
List the three most common uses for your computer 1. ____________
2. ____________ 3. ____________

Comments: ____________
____
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Thank You!

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OPTune

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For technical support, contact Gazelle Systems
at 800-733-0383. Gazelle's technical support BBS
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6:00 p.m. and 8:00 a.m MST.
Gazelle can also be contacted through
CompuServe (76702,265) and MCI Mail (GAZELLE).

OPTune
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TABLE OF CONTENTS

LICENSE AGREEMENT

Definition Of Terms 1
Grant Of License 1
Software Copies 2
Source Code 3
Disclaimer Of Liability 3
General Conditions 3

LIMITED WARRANTY

What Is Covered 4
Warranty Period 4
What Gazelle Will Do 5
What Gazelle Will NOT Do 6
What Licensee Must Do 6
Other Conditions 7

MATERIALS 8

SYSTEM REQUIREMENTS 9

INTRODUCTION TO OPTUNE

What is OPTune? 10
Why you should use OPTune. 12
Features 13
Limitations 15
OPTune Safety Tips 18
Installation 19
Customizing Color For OPTune 20

TABLE OF CONTENTS

USING OPTune

Understanding OPTune's Menu-Line 22
Daily Use 25
Optimize 27
Tune-Disk 34
Check-Disk 41
Verify/Fix-Disk 45
Quit 52
Command-Line Parameters 54
Using OPTune in Batch Files 61
Batch Files For Power Users 63

REFERENCE SECTION

Tune-Disk Technical Information 64
Check-Disk Technical Information 66
Verify/Fix-Disk Technical Information 68

APPENDICES

Appendix A – Error Messages 70
Appendix B – Glossary 80
Appendix C – Index 88

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MATERIALS

User's Manual

Registration Card (return within 10 days)

Support Order Form (extended technical support option)

Diskette containing the following **OPTune** program files:

- OPTUNE.EXE
- OPSTART.EXE
- OPCOLOR.EXE
- RECOVER.EXE
- SAMPLE.BAT
- README

The "README" file on your distribution diskette contains additional information not listed in the manual. Use the DOS "TYPE" or "PRINT" commands to review this file.

SYSTEM REQUIREMENTS

OPTune requires the following:

1) IBM PC, XT, AT, PS/2 or compatible

2) MS- or PC-DOS version 2.00 (or higher)

3) At least 256K of installed memory.

The actual memory requirements will vary from one disk to another as OPTune dynamically adjusts itself to your computer's available memory. About 150K of free RAM is required to optimize most hard disks. Disks greater than 32 MB or disks having more than 2,000 file entries may need more memory to function (A 120 MB disk with 3,500 files would require about 240K of available memory. A 500 MB disk with 8,000 files would require about 440K of available memory).

In most cases, **OPTune** will operate faster when more memory is available. The **OPSTART** program will test to make sure that an appropriate amount of memory is free. **OPTune** will inform you if there is not enough memory.

The documentation found in this User's Manual will guide you through using **OPTune** step-by-step. On-line help is available on the main screen. In the unlikely event that you still need assistance in using **OPTune**, please feel free to call our toll-free customer support line (800)-RUN FAST

If you take a few moments to familiarize yourself with the Introduction, Reference, and Appendices sections of this manual, you will soon see how easy it is to use **OPTune** to make your hard disk run as efficiently as possible.

INTRODUCTION TO OPTUNE

WHAT IS OPTUNE?

OPTune is an extremely fast and reliable software utility that can dramatically improve the performance of your hard disk by ensuring the most efficient operation of your mass-storage system. **OPTune** offers you complete hard-disk optimization. This includes:

DOS Optimization

OPTune optimizes your disk's DOS structure by sorting and squeezing your file and directory entries. This speeds-up directory operations and allows programs to load much faster. This also greatly reduces wear-and-tear on your drive and decreases the time spent in searching your disk's directories.

File Defragmentation

OPTune defragments *all* the files on your disk, and *will not stop* before the job is finished (unless, of course, you tell it to). It will physically realign the different segments of files that DOS has scattered on your disk. By organizing your files, **OPTune** will make data accessing much faster, and your system will be much more efficient. (DOS will only have to go to one location to read a file, rather than moving all over the disk to find the various parts of fragmented files.) **OPTune** will completely defragment every file on your disk, unlike some competing products that stop the optimization process before it is completed.

Interleave Optimization

OPTune allows you to modify the low-level format (see **Glossary**) of your disk, ensuring that your computer system communicates with your disk as efficiently as possible.

Complete Integrity Verification.

OPTune checks the complete DOS file and directory structure before each optimization, and can fix any problems that surface. In addition, the program can search for and repair problem spots on your disk, even if those spots are currently being used by files.

OPTune can also predict and prevent DOS errors before they damage your files. Any part of your hard disk that is even marginally bad can be permanently blocked out so that DOS will never again use that section of the disk.

Safety and Reliability.

With regular use, **OPTune** actually makes your disk more reliable. In addition to preventing disk errors and recovering damaged files, **OPTune** can also strengthen the magnetic fields on your disk, thereby reducing the probability that you will ever see the "Abort, Retry, Ignore?" message resulting from disk problems.

Compatibility.

OPTune is the only optimizer that is completely compatible with **Q-DOS II** (Gazelle Systems' blazingly fast file manager). When you run **Q-DOS II** after using **OPTune**, it will automatically rescan your optimized drive, so that it will properly understand your new, optimized directory structure.

WHY YOU SHOULD USE OPTUNE

OPTune is faster.

OPTune combines the features and benefits of the best optimizers available into one complete package that offers increased speed and flexibility. **OPTune** performs its tasks up to 10 times faster than competing optimizers.

Generally, **OPTune** will initially take from 4 to 5 minutes to optimize a 20 MB hard-disk (other products spend an average of 30 minutes). Thereafter, daily optimization will take from 20 to 30 seconds (**OPTune** will not "re-optimize" a disk unnecessarily–it will organize only those files that require optimization).

OPTune is the most comprehensive optimizer.

OPTune's unique combination of features handles *all* phases of disk optimization. Other products produce good end results, but are notoriously slow (they often take over an hour to optimize a 32 MB disk). Faster competitors, on the other hand, often leave portions of the disk still fragmented. In addition, competing programs cannot support larger hard disks, and they will not work with the newer, more-sophisticated versions of DOS.

OPTune is safer.

By researching all of our competitors' products we discovered that most of them, under the guise of "making sure that your disk's sensitive areas are always correct," spend up to 40% of the optimization process updating the file allocation tables and directory entries. **THIS IS EXTREMELY DANGEROUS.**

On the other hand, **OPTune** generally spends a *maximum* of 10% of its time updating the File Allocation Table (usually only 20-25 seconds). If a power failure were to occur during optimization, in most cases no data would be lost; however, your disk would not be totally optimized. In the event of damage, **OPTune's** built-in **Check-Disk** command could help recover any lost data.

FEATURES

3 Types Of Optimization

OPTune is the only optimizer available that offers all phases of disk optimization. It will perform DOS optimization, file defragmentation, and permanent tuning of your hard disk.

Speed

OPTune offers the fastest optimization available (2-10 times faster than competing products)!
In addition, it can *permanently* adjust your hard disk so that it runs from 20% to 300% faster.

Flexibility

OPTune can handle unusual disk formats such as:

1) All disk structures created and supported by Compaq's DOS 3.31 and higher

2) Disks having more than 2 file allocation tables

3) Disks with root directories holding 1,024 or more entries

4) Disks created using special hard-disk partitioning schemes requiring special device drivers.

Safety and Reliability

We have done everything possible to ensure that your hard disk will perform faithfully, while at the same time producing the safest product possible. Our safety features include:

- **A Check-Disk** function. OPTune is the only product with its own built-in **Check-Disk** function that improves on *all* elements of the DOS "CHKDSK" command. **Check-Disk** is run every time you use the optimizer; if there is *anything* wrong with your disk's DOS structure, the optimizer will not allow you to proceed until the problem is corrected.

- **A Verify/Fix-Disk function. OPTune** is the only product with its own built-in verification function that can *actually predict and prevent DOS errors before they destroy your data.* Our sensitive bit-pattern testing subjects your disk to the most rigourous media verification possible. This will flush out sectors that are starting to go bad long before they would ever be detected by other means.

LIMITATIONS

The program will support any hard disk or any DOS partition, given these constraints:

1) The DOS sector size is 16,384 bytes or smaller (most disks use 512 bytes per sector), and the cluster size (see **Glossary)** does not exceed 64K

2) No single file is greater than 2,147,483,647 bytes

3) There are no more than about 15,000 total files and directories on the hard disk being optimized (this is due to the 640K memory constraint in DOS)

4) There is at least one unused cluster (see **Glossary**) on the disk being optimized (if not, simply erase one file)

5) The **Tune-Disk** command requires that the hard disk's physical sector size be 512 bytes; all other commands (**Optimize**, **Verify/Fix-Disk**, and **Check-Disk**) operate with all sector sizes up to 16,384 bytes.

Cautions

1) *You must not use OPTune on an active network or in a multi-tasking environment.* If you try to optimize a disk under these conditions, the data on the disk may be ruined. **OPTune should only be used on network disks before the network is activated.**

2) **OPTune** *will not* work on a Novell disk server, or on other network systems that do not allow direct-sector reads or that utilize non-standard directory formats.

3) In most cases, **OPTune** should not be used when disk-caching software is active (see "About Disk Caching"). Specifically, disk caching programs that provide "intelligent-write" or "delayed-write" capabilities may cause your hard disk to fail when **OPTune** is working. **OPTune** tests for these features and warns you if disk caching will affect the function you wish to use; **OPTune** will not run **Tune-Disk**, for example, if disk caching software is detected.

Please refer to the "Using **OPTune**" section for information on the safest way to use this utility.

About Disk Caching

Recently, many software companies have introduced products known as "disk caching" programs. This software is designed to increase computer processing speed by keeping frequently accessed hard-disk data in RAM. By eliminating the need to access the hard drive, this software can make many operations faster–sometimes even hundreds of times faster.

Such an increase in performance is usually very desirable. However, eliminating actual disk accesses *can cause severe problems* for products like **OPTune**. For example, a disk cache can prevent an actual disk access from occurring during **Verify/Fix-Disk**. The cache will cause **Verify/Fix-Disk** to read information as it is in RAM, rather than as it actually is on the hard disk. This will prevent accurate detection of hard-disk problems.

Disk caching software can also cause serious problems when **Tune-Disk** is altering the interleave of a hard disk. Many cache programs eliminate disk accesses whenever they recognize that data which is about to be written to an area of a disk is identical to the data which was last read from that area of the disk. If the cache is not intelligent enough to recognize that the disk has been reformatted since data was last read, then data will not be written to the disk and will therefore be lost.

If **OPTune** detects disk caching software, it will either warn you about the disk caching or prevent **OPTune** functions from operating if your disk will be damaged. *For best results, we highly recommend that your caching software be deactivated prior to using OPTune.*

> **NOTE**: Since disk caching creates an additional buffer for the computer to process, it will slow down the disk when disk functions that require only one pass (such as **Verify/Fix-Disk**) are executed. Other functions that require several passes will often report erroneous information when disk-caching software is activated.

OPTUNE SAFETY TIPS

OPTune is a specialized program that manipulates the most critical and sensitive parts of your hard disk–the directories, the file allocation tables, and the actual programs and data. Because of this, there are certain risks involved. For increased safety, we recommend that you consider the following:

U.P.S. System

Most of the warnings and cautions that we mention apply to all programs you use, since DOS itself manipulates these same sensitive areas of the disk and is also adversely affected by power failures and other unforeseen disasters that happen "at the wrong time." We recommend that you use an **Uninterruptible Power Supply**. This will safeguard all of your equipment against the effects of unexpected power loss.

Do Frequent Backups!

We recommend that you backup your hard disk before using **OPTune** (if you do not have a high-speed backup utility, we suggest that you look into Gazelle Systems' **Back-It**, available through your local dealer). If a power failure or some other unforeseen disaster occurs, your data will be recoverable.

A Note About Copy-Protected Software:

You should be aware that some copy-protected software programs will not allow manipulation of certain files. In most cases (in programs manufactured by Lotus,™ Ashton-Tate,™ and a few other large companies), these files are specially marked as hidden and/or systems files. Before using OPTune with copy-protected software, contact Gazelle Systems or the product manufacturer for more specific information.

Other programs may use "non-conventional" protection schemes that **OPTune** does not recognize. You may want to consult with the software manufacturer before optimizing disks with copy-protected files.

INSTALLATION

OPTune is not copy-protected, and therefore can be installed using the DOS COPY command. However, the following procedure is recommended for installing **OPTune** on your hard-disk.

1) First, read the LICENSE AGREEMENT and WARRANTY in the front of the manual. If you agree with the terms outlined, then continue with the following steps.

2) Make a copy of your **OPTune** disk. To do this, type the command "**DISKCOPY A: B:**" and then follow the instructions on your screen. Store your original **OPTune** disk in a safe place and use the copy for the rest of the installation process.

3) Type the command "**A:OPSTART**" and follow the instructions on the screen. This installation program will automatically install OPTune for you, and will also make sure that the disk onto which OPTune is installed is safe and reliable.

The installation of **OPTune** should now be complete.

SET OPTUNE = C:\ OPTUNE

CUSTOMIZING COLOR FOR OPTUNE

OPTune supports most monochrome CGA, EGA, VGA, and Hercules graphics cards and monitors. If you use a color or composite-video monitor, or if you simply want to alter the way **OPTune** looks on your screen, use the **OPCOLOR** program included on your distribution disk. (If you use **Q-DOS** or **Back-It**, you may already know how to use this program.)

To modify the colors in the **OPTune** program, follow these steps:

1) Exit the program you may be using. You must run **OPCOLOR** from your DOS prompt.

2) If you are modifying **OPTune** on a floppy diskette, insert the diskette into drive A, type **A:** and press **RETURN**.

If you are modifying **OPTune** on your hard disk, type **C:** and press **RETURN.** Then type **CD\OPTUNE** and press **RETURN**. (This assumes that the "**OPSTART**" program was used to install **OPTune** on drive **C** in the **\OPTUNE** directory. If **OPTune** was installed in another subdirectory, you must change to the subdirectory in which **OPTune** was installed.)

OPCOLOR actually modifies the **OPTUNE.EXE** file on the disk. To do this, the **OPTUNE.EXE** program must be in the current directory of the current drive. The above instructions ensure that this is the case.

3) Type **OPCOLOR** and press **RETURN**. This starts the color modification program. A menu listing sections of the screen that can be changed will appear in the lower right-hand corner.

4) To select the default colors, press **C**. If you would like to modify the screen colors, select a number (from 1-5) from the menu. Press the number until the color of your choice appears.

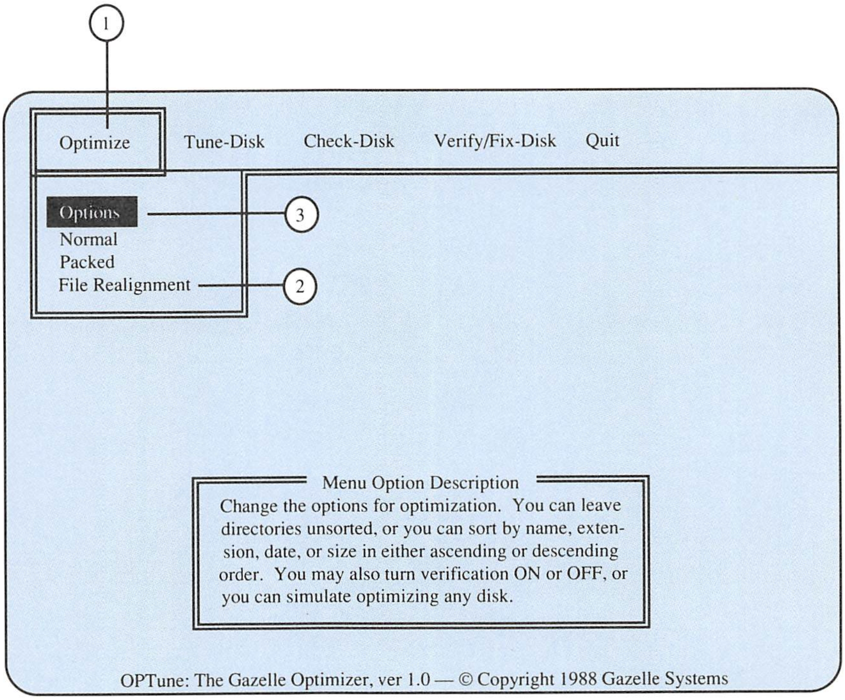
   The colors "rotate" in one direction. To change this direction, simply press the UP or the DOWN arrow key. To return to the default colors, press **C** (or **M** if using a monochrome monitor). To read **OPTune**'s current color setting, press **F1**.

5) When you have finished modifying the colors, simply press **RETURN** to save them. To exit without saving the colors, press **ESC**.

USING OPTUNE

UNDERSTANDING OPTUNE'S MENU-LINE

OPTune uses a simple menu-line structure which has 3 levels. These include COMMANDS, FUNCTIONS, and OPTIONS.



Menu Option Description

Change the options for optimization. You can leave directories unsorted, or you can sort by name, extension, date, or size in either ascending or descending order. You may also turn verification ON or OFF, or you can simulate optimizing any disk.

OPTune: The Gazelle Optimizer, ver 1.0 — © Copyright 1988 Gazelle Systems

The main OPTune screen, This screen displays all three levels of OPTune's command structure: 1) commands, 2) Functions, and 3) Options.

Command Selection

To choose any command, move the cursor with the LEFT or RIGHT arrow key until it highlights the desired command and then press **RETURN** (pressing the DOWN arrow key has the same effect). Commands may also be selected with a single key-stroke by pressing the *first letter* of the desired command. These key letters are bolder than the other characters on the command line.

Function Selection

When a command is selected, a "pull-down menu" will then be displayed. To select any function on the menu, move the cursor with the UP or DOWN arrow key until it highlights the desired function and then press **RETURN**. As with commands, functions may also be initiated by pressing the *first letter* of the desired function. Again, these letters are bolder than the other characters on the pull-down menu.

If you have already "pulled down" a command menu, you can view "pull-down" menus for other commands simply by pressing the RIGHT and LEFT arrow keys. (This can save you time if you accidentally select the wrong command.)

Option Selection

In some cases, when a function is selected, a menu which displays possible options will appear in the center of the screen. You can specify certain aspects of the selected command by using the UP and DOWN arrow keys. Option settings may be changed by highlighting them and pressing the **SPACE BAR** or by typing in the appropriate response. Once the settings have been adjusted, you may return to the command's pull-down menu by pressing **RETURN** or **ESC**.

Escape

At any time you may press **ESC** to cancel the current selection and return to the previous level in the command structure. The **ESC** key will also cancel any command while in progress. This allows you to recover from commands that were executed improperly and gives you more control over **OPTune**.

Help

As each command, function, and option is selected, a brief explanation appears in the box located at the bottom of the screen. For more information, please refer to the appropriate section of this manual.

To Quit

By pressing the **F10** key once you can immediately exit **OPTune** from any command level. This bypasses the "Park" feature, and immediately returns you to the DOS prompt (see the section on the **QUIT** command for more information).

OPTUNE-DAILY USE

Using **OPTune** is the fastest and easiest way to ensure that your disk operates as efficiently and reliably as possible.

Daily Use

For most users, the **Normal** optimization in **OPTune** will be the best way to make sure that your disk is fast and that it has no DOS errors (**OPTune** always runs its internal **Check-Disk** command before each optimization, and will let you know if any problems exist). [For information on optimization options, see the **Optimize** section of "Using **OPTune**".] We suggest that you install a command in your **AUTOEXEC.BAT** file (one command line for each of your disk drives) so that **OPTune** can optimize your disk(s) before you start your work for the day.

If you do a lot of work with data bases, or use applications that create or modify large files, you will get better results by using the **Packed** optimization option. This ensures that your disk will stay defragmented for as long as possible. This type of optimization takes only a slightly longer than the **Normal** optimization.

We do not recommend the **File Realignment** option for daily optimizations, as it takes longer than either **Normal** or **Packed**. However, if you use applications that use many files in a given directory (such as computerized bulletin boards), you may consider using this option at least once a week.

Weekly Use

At least once a week, we recommend that you use the **Packed** option to remove any free spaces between files.

You should also use the **Check-Disk** command weekly, although the **Optimize** command always runs this internally before performing any optimization.

In addition, you should consider performing a **Read-Only** verification of each of your disks every week to see if any parts of the disk have become blatantly unusable. If you do this, **OPTune** will be able to block out any marginal parts of your disk, thereby preventing data loss and corruption.

Monthly Use

Some users may want to run the **File Realignment** option to optimize their disks on a monthly basis. However, most users will not see much improvement with this type of optimization (as opposed to a **Packed** optimization).

It is also a good idea to perform one of the bit-test patterns in the **Verify/Fix-Disk** command to see if any parts of your disk are starting to become bad.

Quarterly Use

You should run either level 2 or level 3 bit testing on each of your disks (using the **Verify/Fix-Disk** command) to eliminate any bad spots on your disk.

Yearly Use

At least twice a year, you should use the **Tune-Disk** command to strengthen the format on your disk.

You should also perform the deepest bit testing (level 3) of the **Verify/Fix-Disk** command to thoroughly test your hard disk. This will ensure that you have many years of trouble-free use of your hard disk.

OPTIMIZE

Purpose

Optimize performs two very important services: 1) it defragments files (by gathering all the information contained in a file into one physical location), and 2) it reorganizes your DOS structure so that it is more efficient. By using the **Optimize** command on a regular basis, you increase the speed at which files can be accessed and reduce wear-and-tear on your hard disk.

Optimize has three very important functions:

1) **It checks the integrity of your disk.** Before entering the actual disk-optimization phase, **Optimize** performs a complete **Check-Disk** analysis of your disk, ensuring that its DOS integrity is intact; if there are any problems, you are instructed to run the **Fix** option of the **Check-Disk** routine.

2) **It reduces the wear and tear on your disk's read/write-head positioning mechanisms. Optimize** arranges the files on your hard disk so that minimal head movement is required for file access. This significantly reduces the chance that your hard disk will break down prematurely. **Optimize** will also save you valuable time, since an optimized disk operates faster than one that is not optimized.

3) **It protects your valuable data. OPTune**, unlike some other optimizers, makes *all* of your files 100% contiguous. This is extremely important in the event that critical files are inadvertently erased. If a file is contiguous, you should be able to successfully "unerase" it by using one of the various file recovery programs on the market. *If it is not contiguous, there is a possibility that part or all of the file will be lost.*

We recommend that you use **Optimize** daily. In fact, you can insure that you start the day with an optimized disk if you include an **OPTune** command in your AUTOEXEC.BAT file. (See the section on COMMAND LINE PARAMETERS. Be sure to execute the **Optimize** command BEFORE you load network, multitasking, or other memory-resident software.)

> **Note**: All **Optimize** commands may be performed on floppy disks. However, it is generally unnecessary to optimize floppy disks because they generally have small capacity, few files, and they do not noticeably slow down when files become fragmented.

Summary

The **Optimize** commands can be used to "defragment" your hard disk, thereby increasing its speed of operation. Several functions and options are available which allow flexibility in effectively optimizing your disk. The following is a complete explanation of each of the **Optimize** sub-commands.

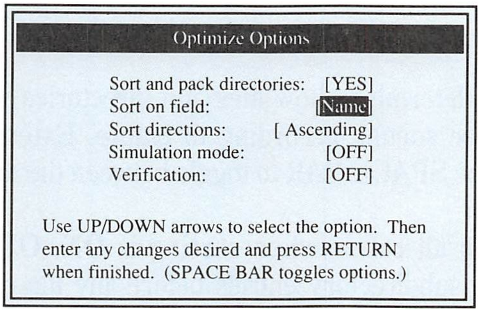
OPTIONS

Purpose

These options give you control over certain aspects of the **Optimize** command. You can choose to physically sort your files and directories. When sorting is selected, you can specify how directories should be sorted (by **Name**, **Extension**, **Date**, or **Size**, in **Ascending** or **Descending** order). You can also specify whether to use read-after-write verification during the optimization, or whether to simulate an optimization of your current disk's structure.

To Use

When **Options** is selected, a menu will appear in the middle of your screen listing certain adjustable settings of the **Optimize** command. These settings are changed using the UP and DOWN arrow keys and the **SPACE BAR**. Once you have selected the desired settings, pressing **RETURN** or **ESC** will make the necessary changes and return you to the **Optimize** pull-down menu.



Sort and pack directories: [YES]
Sort on field: [Name]
Sort directions: [Ascending]
Simulation mode: [OFF]
Verification: [OFF]

Use UP/DOWN arrows to select the option. Then enter any changes desired and press RETURN when finished. (SPACE BAR toggles options.)

The Optimize options. Use the UP and DOWN arrows to select the options that you wish to change. The **SPACE BAR** *is used to toggle between fields.*

Each of these option settings is described below:

Sort Directories:

This setting determines whether your directory entries should be sorted. Press the **SPACE BAR** to toggle between **Yes** and **No**. Directory sorting is performed during all types of optimization (**Normal**, **Packed**, and **Realignment**).

If you choose to sort your subdirectories and files, the "DIR" command in DOS will be easier for you to understand–your files will always be displayed in sorted order. However, in some cases you will not want to change the order of your directories. For the most part, we recommend that you keep the Sort function activated.

Sort on Field:

This function determines how files and directories will be sorted. You can choose sorting according to **Name**, **Extension**, **Size** or **Date**. Press the **SPACE BAR** to toggle between the different fields.

> NOTE: In all cases, when sorting is **ON**, **OPTune** always places the subdirectory entries before any file entries in each directory.

Sort Direction:

The directory can be sorted in **Ascending** or **Descending** order. Use the **SPACE BAR** to toggle between the two options.

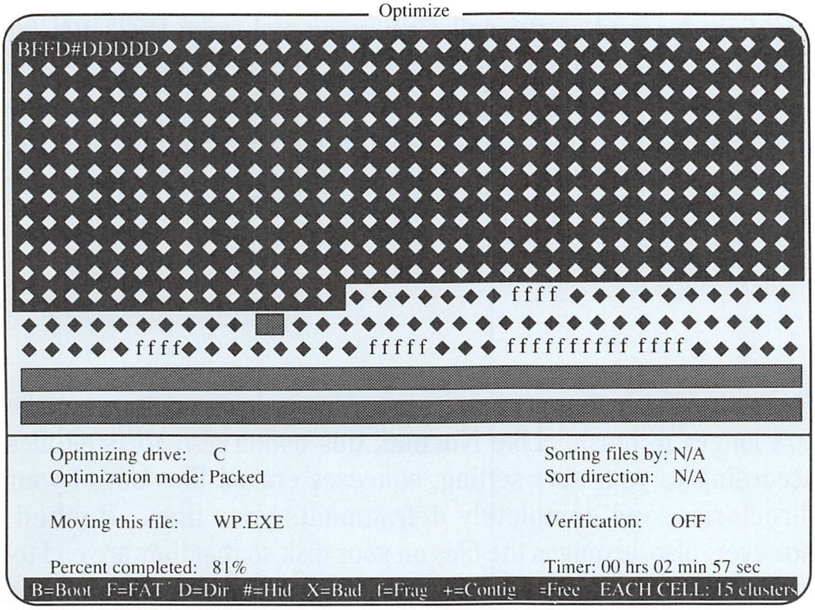
> NOTE: All sorting is actually done with *at least* two fields: **Name** sorts by name then extension; **Extension** sorts by extension then name, **Size** sorts by size, then name, then extension, and **Date** sorts by date, then time, then name, then extension.

Simulation Mode:

You can turn Simulation **On** or **Off**. When it is **On**, no physical changes are actually made to the disk and the **Check-Disk** function automatically verifies that the optimization process will work properly on your disk. Press the **SPACE BAR** to toggle between the two options.

Verification:

You can turn verification mode **On** or **Off**. Press the **SPACE BAR** to toggle between **Yes** and **No**. When Verification is **On**, **OPTune** will perform read-after-write verification of all disk writes. This takes somewhat longer, but acts as an extra safeguard for your data.



```
Optimizing drive:     C                    Sorting files by: N/A
Optimization mode: Packed                  Sort direction:   N/A

Moving this file:     WP.EXE               Verification:     OFF

Percent completed:  81%                    Timer: 00 hrs 02 min 57 sec
B=Boot  F=FAT  D=Dir  #=Hid  X=Bad  f=Frag  +=Contig  =Free  EACH CELL: 15 clusters
```

The Optimize command in progress. In packed mode, defragmented files are placed end-to-end with no empty spaces between them.

NORMAL

Purpose

Normal optimization is extremely fast, leaves your files 100% defragmented, sorts all files according to your sort setting, and squeezes erased files out of your directories. When **Normal** is completed, none of your files will be stored in multiple pieces on your disk–each file will be stored as one contiguous "chunk". **Normal** will not eliminate all empty spaces between files, but it is extremely fast. We recommend that you use **Normal** as part of your daily hard disk maintenance routine.

To Use

Highlight **Normal** on the pull-down menu and press **RETURN** (or simply press "N"). Enter the letter of the drive you wish to optimize (as prompted). [The default drive is either the "current" drive or the last drive you specified. If you wish to optimize the default drive, simply press **RETURN**. If you wish to optimize another drive, enter the drive letter.]

PACKED

Purpose

Packed offers better end results than **Normal**, although it can take 50% longer to finish. Like **Normal**, this option also sorts all files according to your sort setting, squeezes erased files out of your directories, and completely defragments your files. **Packed**, however, also arranges the files on your disk so that they are end-to-end. Since there is no empty space between the files on your hard disk, chances are that new files will be written to the disk without being fragmented. **Packed** optimization ensures that your hard disk stays optimally arranged for as long as possible.

To Use

Highlight **Packed** on the pull-down menu and press **RETURN** (or simply press "**P**"). Enter the letter of the drive you wish to optimize (as prompted).

[The default drive is either the "current" drive or the last drive you specified. If you wish to optimize the default drive, simply press **RETURN**. If you wish to optimize another drive, enter the drive letter.]

> **NOTE:** The first time that you perform a **Packed** optimization, it will probably take from 4 to 5 minutes (**Normal** optimizations are up to 50% faster). If you optimize once a day, subsequent optimization should take only 20 to 30 seconds.

FILE REALIGNMENT

Purpose

This is by far the most thorough of any of the optimization methods available. Like **Normal** and **Packed**, this option also sorts all files according to the sorting options that you select and squeezes erased files out of your directories. It then performs a "packed" optimization, but also physically arranges files on the disk in the same order as the sorted (or unsorted) directory entries. **File Realignment** takes longer, but it increases efficiency when many files are usually accessed in a sequential order.

To Use

Highlight **File Realignment** on the pull-down menu and press **RETURN** (or press "**F**"). Enter the letter of the drive you wish to optimize (as prompted). [The default drive is the "current" drive or the last drive you specified. If you wish to optimize the default drive, simply press **RETURN**. If you wish to optimize another drive, enter the drive letter.]

> **Note:** When **Optimize** has been successfully completed, a message will appear on screen which reads: "Disk successfully optimized! Press any key to return to the main menu."

TUNE-DISK

Purpose

Just as a tune-up for your car ensures that your engine is running as smoothly as possible, **Tune-Disk** ensures that your hard disk is in synchronization with its controller and the speed of your computer's CPU (Central Processing Unit). This increases efficiency and creates a permanent enhancement to your disk.

This command has two very important features:

1) **Optimizes low-level format.**
   Tune-Disk tests your hard disk to make sure that its low-level format is working at peak performance with your computer system *and* that information is being retrieved as quickly as possible. If **Tune-Disk** determines that your hard disk's speed can be improved, it will non-destructively re-format your disk. This will ensure that your disk will *permanently* run much faster than ever before.

2) **Strengthens magnetic signals.**
   Over time, the magnetic signals on your hard disk fade. As these signals fade, it becomes progressively more difficult for your computer to read them. Weak signals often result in disk errors.

The **Tune-Disk** command, however, can strengthen all the magnetic signals on your disk by reformatting your hard disk. This can prevent parts of your disk from becoming error prone, and can even restore some marginal parts of your disk.

We recommend that you use **Tune-Disk** at least twice a year on each hard disk. It should also be used any time you change your computer's microprocessor or microprocessor speed (if you purchase and install a 386- or 286-speedup board in an AT or PC/XT computer, for example, or if you install a new hard-disk controller). It will take about 10 minutes to run **Tune-Disk** on an AT with a 20 MB disk, and about 25 minutes on a PC/XT.

> **Note:** Unlike the other **OPTune** commands, **Tune-Disk** cannot be performed on a floppy disk. It may only be used on hard disks that require low-level formatting.

Summary

Tune-Disk ensures that your hard disk is properly formatted to run as efficiently as possible. If **Tune-Disk**'s initial testing shows that your hard disk's performance can be improved, it will non-destructively format your disk (and adjust the low-level interleave setting) so that it operates faster and more efficiently. This allows the format of the disk to be strengthened, thereby preventing disk-errors.

OPTIONS

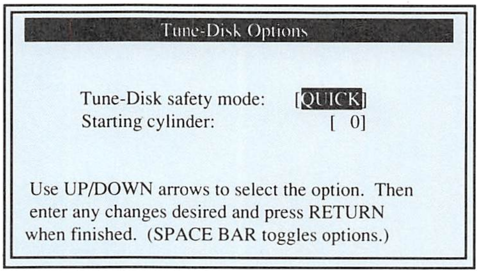
Purpose

The **Tune-Disk** options allow you to choose the mode (**Safe** or **Quick**) in which this function is executed and also allow you to start **Tune-Disk** at a specific point on your hard disk.

To Use

Highlight **Options** on the pull-down menu and press **RETURN** (or simply press "**O**"). When **Options** is selected, a menu displaying the **Tune-Disk** options will appear in the middle of the screen. Options are selected (highlighted) with the UP and DOWN arrow keys and toggled with the **SPACE BAR** (once you have highlighted an option, simply press the **SPACE BAR** until the selection of your choice appears in the box). When you have changed the settings and are ready to continue with the **Tune-Disk** command (or if you simply want to exit from this command), press either **RETURN** or **ESC**.

Each of Tune-Disk's option settings are described in detail below:



Tune-Disk Options

Tune-Disk safety mode: [QUICK]
Starting cylinder: [0]

Use UP/DOWN arrows to select the option. Then enter any changes desired and press RETURN when finished. (SPACE BAR toggles options.)

The Tune-Disk Option Screen.

Operation mode:

Tune-Disk can run in **Safe** mode or in **Quick** mode.

Safe:

Safe mode is the default setting. During the **Safe** mode, the information on your hard disk is constantly protected. When you use the **Safe** mode, you can always recover from a power failure in the middle of **Tune-Disk** (the **RECOVER.EXE** program included on your master disk will be able to fix your disk; the **RECOVER.EXE** program will **NOT** be able to recover information lost during the **Quick** mode). The **Safe** mode requires a reliable, formatted floppy disk to be inserted into drive **A** during **Tune-Disk**'s operation.

We recommend that you use **Tune-Disk** in **Safe** mode because it guarantees that you will be able to restore any data that becomes lost or corrupted in the event of a power failure.

Quick:

Quick mode is almost twice as fast as **Safe** mode. During the **Quick** mode, however, important safeguards which protect your data are bypassed. This means that if a power failure occurs during **Tune-Disk**, your data will be lost. If there is no power failure, all will be fine.

It should be noted that the **Quick** and **Safe** modes are provided due to the possibility that a power interruption or failure could occur during **Tune-Disk**'s operation. Under normal circumstances, the **Quick** mode provides all necessary safeguards for your data. However, since it is impossible to control all aspects of your computer's environment, we recommend backing up your hard disk and taking these extra precautions to reduce the possibility of losing data.

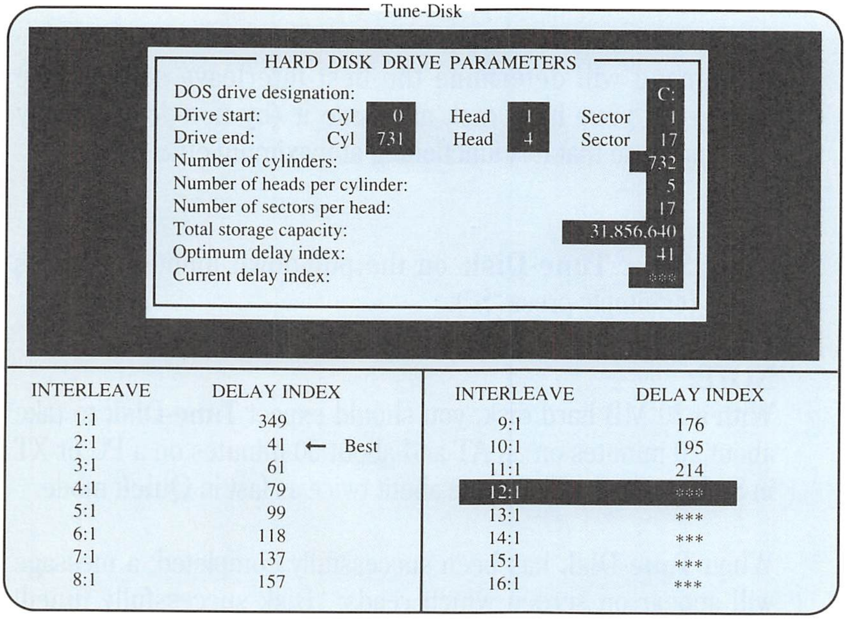
Starting point:

You have the option of telling **Tune-Disk** which cylinder to begin with. **Tune-Disk** usually starts at the beginning of your disk. If you must interrupt **Tune-Disk** while it is running, you can note the cylinder number at which **Tune-Disk** was interrupted and then resume at a later time by using this option.

TEST

Purpose

This function will determine and report the best interleave setting on your hard disk without making any changes in your disk's format.



```
                              Tune-Disk
            HARD DISK DRIVE PARAMETERS
   DOS drive designation:                                   C:
   Drive start:        Cyl     0     Head   1     Sector     1
   Drive end:          Cyl   731     Head   4     Sector    17
   Number of cylinders:                                    732
   Number of heads per cylinder:                             5
   Number of sectors per head:                              17
   Total storage capacity:                          31,856,640
   Optimum delay index:                                     41
   Current delay index:                                    ***

 INTERLEAVE     DELAY INDEX          INTERLEAVE     DELAY INDEX
    1:1             349                  9:1            176
    2:1              41  ← Best         10:1            195
    3:1              61                 11:1            214
    4:1              79                 12:1            ***
    5:1              99                 13:1            ***
    6:1             118                 14:1            ***
    7:1             137                 15:1            ***
    8:1             157                 16:1            ***
```

Tune-Disk tests your hard disk to determine which interleave setting is best for your system. The information screen provides you with extensive data about your hard disk and indicates the best interleave setting for your system.

To Use

Highlight **Test** on the pull-down menu and press **RETURN** (or simply press "T"). This test takes less than one minute on most hard disks.

START TUNE-DISK

Purpose

This command will determine the best interleave setting (see **Glossary**) for your hard disk and tune it (by non-destructively reformatting it) so that it is functioning at maximum efficiency.

To Use

Highlight **Start Tune-Disk** on the pull-down menu and press **RETURN** (or simply press "S").

> **NOTE:**
> With a 20 MB hard disk, you should expect **Tune-Disk** to take about 20 minutes on an AT and about 50 minutes on a PC or XT in **Safe** mode; it will operate about twice as fast in **Quick** mode.
>
> When **Tune-Disk** has been successfully completed, a message will appear on screen which reads: "Disk successfully tuned! Press any key to return to the main menu. "

CHECK DISK

Purpose

Check-Disk performs the same function as the DOS "CHKDSK" program. It verifies the DOS File Allocation Table (FAT) structure on your hard-disk and all directory and subdirectory file entries, reports problems, and fixes certain types of errors.

This command has several advantages over the "CHKDSK" program that came with your version of DOS:

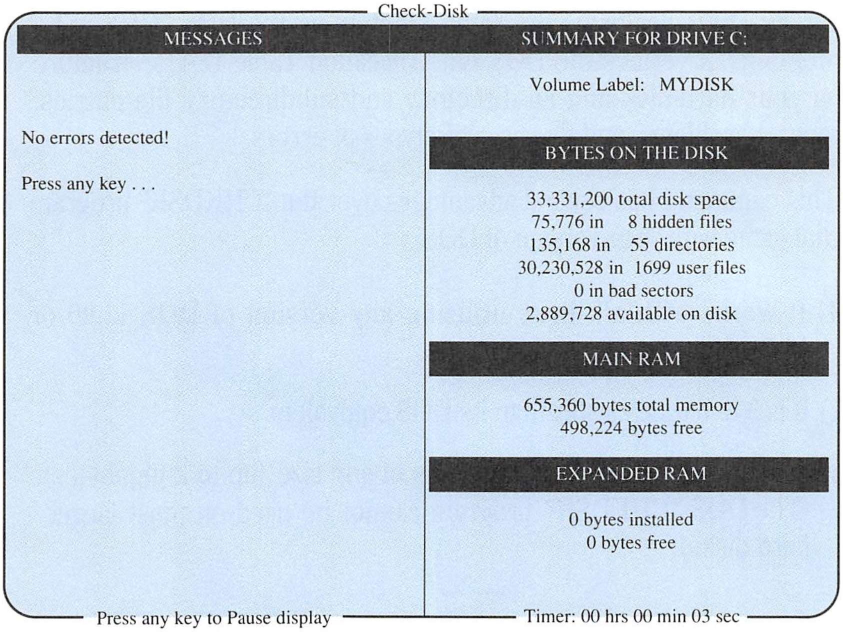
1) It works with all disks utilizing any version of DOS (2.00 or higher).

2) It is 3 to 5 times faster than its DOS equivalent.

3) It works on all disks or partitions of any size (up to 2 gigabytes). (The DOS "CHKDSK" program cannot be used on most larger hard disks).

This command can be used as often as you wish, and it will work on any DOS disk. If you are running the **Optimize** command on a daily basis, then you will use this feature only if a problem on your disk surfaces or if you need to be certain that your disk has not become corrupted (**Optimize** *always* runs **Check-Disk** prior to optimizing your disk).

> **NOTE: OPTune**'s **Check-Disk** command is an extremely reliable way to check the DOS structure of any floppy diskette. Errors are reported and fixed, regardless of diskette capacity and the version of DOS that you are currently using.



Check-Disk

MESSAGES

No errors detected!

Press any key . . .

SUMMARY FOR DRIVE C:

Volume Label: MYDISK

BYTES ON THE DISK

33,331,200 total disk space
75,776 in 8 hidden files
135,168 in 55 directories
30,230,528 in 1699 user files
0 in bad sectors
2,889,728 available on disk

MAIN RAM

655,360 bytes total memory
498,224 bytes free

EXPANDED RAM

0 bytes installed
0 bytes free

Press any key to Pause display

Timer: 00 hrs 00 min 03 sec

The Check-Disk screen displays information about disk space and DOS structure. Check-Disk will list any errors it encounters on the left side of the screen.

Summary

Check-Disk analyzes the integrity of the file and directory structure of your hard disk. It makes sure that directory sectors are readable, that directory entries are valid and legal, and that files are not cross linked. This function will also correct problems so that DOS can function properly on your disk.

The **Check-Disk** command has the following options:

REPORT ONLY

Purpose

This selection will perform **Check-Disk** routines and report any problems it encounters without making any changes on your disk. In addition, this will report available disk space and will indicate the number of files and directories on your disk. It will also inform you of total memory and free memory.

To Use

Highlight the **Report Only** command on the pull-down menu and press **RETURN** (or simply press "**R**"). Enter the drive letter as prompted. [The default drive is either the "current" drive or the last drive you specified. If you wish to use **Check-Disk** on the default drive, simply hit **RETURN.** If you wish to use **Check-Disk** on a drive other than the default drive, then enter the drive letter.]

FIX

Purpose

This selection duplicates all functions of **Report Only** but also fixes DOS structure problems. **Fix** will change unallocated (or lost) clusters to files in the root directory. [**Fix** is similar to the "CHKDSK/F" function in DOS.]

To Use

Highlight the **Fix** command on the pull-down menu and press **RETURN** (or simply press "**F**"). Enter the drive letter as prompted. [The default drive is either the "current" drive or the last drive you specified. If you wish to use **Check-Disk** on the default drive, simply hit **RETURN.** If you wish to use **Check-Disk** on a drive other than the default drive, then enter the drive letter.]

NOTE: We recommend that you use **Check-Disk** weekly to make sure that the DOS structure of each of your disks is functioning properly. If errors are encountered, refer to the "Error Messages" section in Appendix A of this manual for more information.

Both **Optimize** and **Verify/Fix-Disk** automatically perform the **Check-Disk** function. If there are any problems, they will tell you to run **Check-Disk**. The **Check-Disk** routine, however, can be used separately at any time on any DOS drive.

If **Check-Disk** does report that your disk structure contains errors, you may need to recover lost files or lost data. For more information, please refer to the **Check-Disk** command listed in the Reference section of this manual.

VERIFY/FIX DISK

Purpose

This program checks the physical integrity of your hard disk. It reads each sector and tries to find bad or marginal areas. If faulty areas are discovered, **Verify/Fix-Disk** will lock them out, preventing your disk from using unreliable sectors.

Verify/Fix-Disk has four very important features:

1) **Error detection.**
   Verify/Fix-Disk hunts down marginal areas on your disk and prevents DOS from ever putting data on them.

2) **Data protection.**
   This command retrieves data from damaged files and moves it to a safe location on your disk. **Verify/Fix-Disk** will then block out the marginal areas on your disk so that DOS does not try to use them again.

3) **Error prevention.**
   Like **Tune-Disk, Verify/Fix-Disk** strengthens magnetic signals on your disk. This will prevent parts of your disk from becoming marginal.

4) **Crash prevention.**
   Perhaps the most important benefit of this command is that it can actually *predict and prevent hard-disk failures before they occur.* This will save you time, money, and headaches.

OPTune's **Verify/Fix-Disk** function is purposely less tolerant of errors than DOS. DOS will retry a read or write operation 3 to 5 times when it finds an error. Many times this "error retry" logic allows DOS to treat marginal areas on your disk as if they were perfect. When this happens, DOS will continue to store your valuable data on questionable media. **Verify/Fix-Disk** will hunt down marginal spots that DOS would normally pass, and will prevent these spots from destroying data on your disk if and when they do fail completely.

We recommend that you perform a "quick" verification of your disk once every couple of weeks. And, at least 3 or 4 times each year, you should perform a "bit-pattern" verification of your hard disk (For more information about bit-pattern testing, see **Verify/Fix-Disk** in the Reference section of this manual.)

Summary

Verify/Fix-Disk performs a read-only test of your hard disk's media, identifying parts of the disk which have gone bad, and moving files to safe locations on the disk. In addition, this function can perform a bit-pattern test on your hard disk which will flush out potential media failures and prevent disk errors from occurring on the marginal parts of your disk.

OPTIONS

Purpose

The **Verify/Fix-Disk** Options enable you to determine how many times to verify your disk and whether errors will be fixed automatically. These options also allow you to specify the level of testing (deeper testing levels take more time, but may be more effective in detecting bad or marginal sectors on the disk).

To Use

Options are selected with the UP and DOWN arrow keys and are toggled with the **SPACE BAR** (once you have highlighted an option, press the **SPACE BAR** until the selection of your choice appears in the box. (Where a number or a drive letter is required, simply type in the appropriate response.) When you have selected your options and are ready to continue with **Verify/Fix-Disk** (or if you simply want to exit from this command), press either **RETURN** or **ESC.**

You may select which type of verification to perform by pressing the **SPACE BAR** to toggle through the options. The following is a description of those options:

Read-Only:

This is the quickest type of testing. It simply reads each part of the disk in large chunks (several clusters at a time). Upon encountering an error, **Read-Only** will attempt to fix the disk and recover any file data currently residing on the bad spot on your disk.

Bit-Test:

Three levels of testing are possible (1, 2, and 3). Each level duplicates the functions of previous test in addition to performing more advanced analysis of its own. An important side benefit of this option is that in addition to finding and blocking out bad spots on the disk, it actually refreshes the magnetic signals of all data on the disk. The default mode for the **Bit-Test** option is **Safe,** which requires a floppy disk. The **Quick** mode may also be used. We recommend that you always use the **Safe** mode.

The **Bit-Test** option performs a read-only test first. If it finds no errors, it then performs the additional tests you select. After testing, your original data is rewritten to the disk.

The following is a description of the Bit-Test levels:

Level 1— This test writes a unique bit pattern (512 bytes long) that reverses the magnetic polarity of each bit on the disk and then tests it. This quick test catches most weak spots on a disk about to go bad. This test takes 15-20 minutes on a 20 MB disk.

Level 2—This level performs test 1 and then tests 8 unique bit patterns (32 bytes in length) developed and used by hard disk manufacturers to detect errors. This level then tests 4 other unique bit tests proprietary to Gazelle Systems. Level 2 testing takes 2-3 hours on a 20 MB disk.

Level 3—This level performs test 1 then tests 16 unique bit patterns developed and used by hard disk manufacturers to detect errors. It then tests 8 other bit patterns proprietary to Gazelle Systems. This test takes 5-6 hours on a 20 MB disk. We recommend that you use Level 3 testing when you first start using a new hard disk, preferably cycling at least 3 times.

Verification Mode:

You can select **Quick** or **Safe.** [The **Read-Only** option has only one verification mode, which is equivalent to Safe.]

For **Bit-Test** mode, the **Quick** mode is faster than **Safe**. However, if **Verify/Fix-Disk** is working in Quick mode and a power failure occurs, some data may be lost. If the power fails during **Verify/Fix-Disk,** and you have previously backed up your disk, you should restore it. Or, if you were using the **Safe** mode, simply run the RECOVER program from your **OPTune** disk. We recommend that you always use the safe mode.

Report to printer

Users have the option of having the results of **Verify/Fix-Disk** printed. Press the **SPACE BAR** to toggle between **Yes** and **No.**

Report to disk

The results of **Verify/Fix-Disk** can also be sent to a disk drive in addition to being displayed on the screen. If the results are sent to a disk drive, **Verify/Fix-Disk** creates a file in the root directory on your disk called "VERIFY.RPT". Press the **SPACE BAR** to toggle between **Yes** and **No.**

Drive letter

When you send the **Verify/Fix-Disk** results to a disk drive, you can specify which drive these results are sent to. Enter the drive letter as prompted. You must specify a drive other than the one being verified. If you select the same drive, **Verify/Fix-Disk** will still operate, but the report file VERIFY.RPT will not be generated.

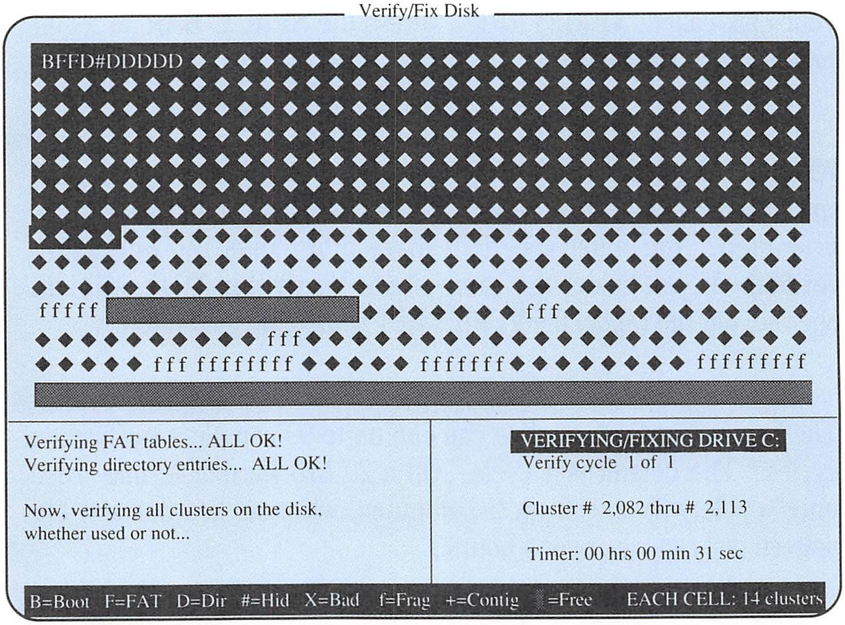
Number of times to verify

The **Verify/Fix-Disk** routine can run up to 99 complete verification cycles. The default is 1 cycle. On a 20 MB hard-disk, one "read only" cycle will take from 2-4 minutes, whereas the deepest bit-pattern test can take over 5 hours.

Fix errors automatically

Verify/Fix-Disk will also fix errors automatically. If this option is selected, **Verify/Fix-Disk** will report errors to the screen and attempt to fix any problems.

If this routine identifies a marginal area that is not being used by any file, **Verify/Fix-Disk** will simply block the area out and continue to verify the rest of the disk. If this routine finds a marginal area which currently contains a file, **Verify/Fix-Disk** will try to read the disk up to 30 times. If Verify/Fix-Disk fails to read the file, a message will appear on the screen informing you that it could not fix the problem.


Verify/Fix Disk
BFFD#DDDDD
fffff
fff
fff fffffff
ffffff
fffffffff

Verifying FAT tables... ALL OK!
Verifying directory entries... ALL OK!

Now, verifying all clusters on the disk, whether used or not...

VERIFYING/FIXING DRIVE C:
Verify cycle 1 of 1

Cluster # 2,082 thru # 2,113

Timer: 00 hrs 00 min 31 sec

B=Boot F=FAT D=Dir #=Hid X=Bad f=Frag +=Contig ▒=Free EACH CELL: 14 clusters

Verify/Fix-Disk can be run in Read-Only mode, or you can select one of three highly sensitive bit-pattern tests to verify your disk's media. These tests include bit-pattern tests used by hard-disk manufacturers.

If you do not select **Fix errors automatically,** the program will give you the option to correct errors or to let them remain. When you select error correction, **Verify/Fix-Disk** will make 10 attempts to read the disk and DOS will repeat each of these attempts 3-5 times. This means that **Verify/Fix-Disk** will try at least 30-50 times to salvage your files.

With both automatic error correction and user-initiated error correction, if the disk is successfully read, then the bad clusters will be blocked out and the file data will be written to a reliable part of the disk. Please be patient with this process, as the method of recovering files from bad portions of the disk may take time. Because of this, we highly recommend using automatic error fixing.

> **NOTE:** Many times sectors deteriorate gradually. We recommend that you run **Verify/Fix-Disk** at least one time per month, to let **OPTune** identify problems before they cause data loss and crash your hard disk. If errors are reported, refer to the "Error Message" Section of (Appendix A) of this manual for more information.

Please refer to the "Daily Use" section for more information on how frequently to use **Verify/Fix-Disk.**

When **Verify/Fix-Disk** has been successfully completed, a message will appear across the bottom of the screen which reads: "Disk successfully verified! Press any key to return to the main menu."

QUIT

Purpose

To exit the program, or to prepare the hard-disk to be moved.

Obviously, the **Quit** command is used to terminate the program. (You can also exit **OPTune** from any menu level by pressing the **F10** key.) However, there is another extremely important feature available with **OPTune**'s **Quit** command–you can park your hard disk. The **Park** option is used to prepare your hard disk to be moved or shipped.

We recommend that you park your hard disk's read/write heads at the end of each day's use. This retracts the physical read/write heads to a safe part of the disk. When the read/write heads are properly parked, your disk can be moved without sustaining any damage. If the heads are not parked, when your hard disk is moved, the read/write heads may scratch your disk and destroy parts of files.

To Use

When the main command line is displayed, highlight **Quit** and press **RETURN** (or simply press "**Q**"). If you desire to park your hard disk, press "**P**". If not, press any other key. If you select the **Park** option, you will be informed as to when to turn off the system's power.

When the disk has been "parked," you may "unpark" it by simply pressing the **ESC** key. (Disks that are self-parking do not need to be parked by this command.) Since "Parking" a disk is only a matter of re-positioning the read-write head, there are no special instructions to follow to prepare the disk for the next usage. Simply turn on your computer, and you are ready.

NOTE: You may wish to enter the command "OPTUNE/P" at the end of each day to automatically park your disk before you turn it off. Please refer to the section entitled "Command-Line Parameters" for more information.

COMMAND-LINE PARAMETERS

When you type "**OPTUNE**" from the DOS prompt and press **RETURN**, you are running **OPTune** in the MENU mode. This means that you use the menu on the main screen to command **OPTune** to perform any of its features. This is the way that most people will initially use **OPTune**.

When you become familiar with **OPTune**, you will want to set up batch files that will take advantage of **OPTune**'s COMMAND-LINE mode. The following is a description of the command-line parameters that can be use to execute **OPTune** functions. (More information is available in the section entitled "Using **OPTune** in Batch Files"; you may also want to inspect the "SAMPLE.BAT": file for complete examples.)

Most of the **OPTune** commands can be accessed by using command-line parameters to start the program. You can also run **OPTune** from batch-file commands, if you wish. (For example, you could tell **OPTune** to optimize your hard disk each time you turn your computer on. See "Using **OPTune** in Batch Files.")

Only one command at a time can be invoked from the command line; to perform multiple functions (such as optimizing more than one drive) you must use multiple commands. The following is a description of the various commands and how to use them.

Deactivating The Disk-Caching Test

OPTune checks your computer system to see whether disk-caching software is active. For some of **OPTune**'s functions (**Tune-Disk** and **Verify/Fix-Disk**), disk caching may cause problems. **OPTune**'s internal safeguards will not allow it to operate in situations where your disk data may be endangered.

Some systems utilize hardware caching which cannot be turned off, and which will not affect **OPTune** negatively. When this hardware is present, **OPTune** will indicate that caching is being used when no caching software is active. If your system is utilizing hardware caching, you need to deactivate **OPTune**'s automatic check for disk-caching software so that **OPTune** can function.

To turn off the disk-cache detection, use the **-I** command on the command line. This **-I** may be inserted anywhere on the command line, and may be used whether you operate **OPTune** in the command-line or in the menu mode.

For example, to run **OPTune** in the MENU mode, simply type "**OPTUNE -I**" and then press **RETURN**. To run **OPTune** in the COMMAND-LINE mode, simply add the **-I** command at the end of your command.

Command:

/O	Optimizes the drive in **Normal** mode, sorting by name in ascending order
/S	Performs a simulated optimization of your hard disk, but make no physical changes to the disk. This command verifies that **OPTune** will work effectively on your drive and will also provide you with a quick analysis of how "fragmented" your hard disk is.
/Z	Same as "/S" above, but reports specific information about your drive, and then proceeds with a **Normal** optimization, sorting by name in ascending order.

The basic format for initiating **OPTIMIZE** from the command line is as follows:

```
OPTUNE [drive:] /[command][option][S[sort field][order]] [V] [/E[Extension]...]
```

Options:
- **N** - Do **Normal** optimization (default)
- **P** - Do **Packed** optimization
- **F** - Do **File Realignment** optimization

Example: "**OPTUNE C: /OP**" on the command line or in a batch file will **O**ptimize drive **C** in **P**acked mode.

Example: "**OPTUNE D: /SF**" on the command line or in a batch file will **S**imulate a **F**ile Realignment optimization of drive **D** without making any changes to drive D.

Example: "**OPTUNE C: /ZP**" on the command line or in a batch file will first simulate a **P**acked optimization of drive **C**. Then, if there were no errors, drive C will then undergo an actual Packed optimization.

You may also specify sorting options with the following format: **S[sort field][sort order]**

Sort field:
- N - **Name** (default)
- **E - Extension/Name**
- **S - Size**
- **D - Date/time**
- **X - No sorting**

Sort order:
- **A - Ascending** (default)
- **D - Descending**

Example: "**OPTUNE D: /ON SSD**" on the command line or in a batch file will **O**ptimize drive **D** in **N**ormal mode, and will **S**ort all directories by **S**ize in **D**escending order.

You may also turn on verification during optimization with the command-line parameter **V** at the end of the command line.

Example: "**OPTUNE C: /ZF SX V**" on the command line or in a batch file will first simulate a **F**ile Realignment optimization on drive **C** with **S**orting turned off ("**X**"). If there are no errors, then **OPTune** will proceed with the actual FILE REALIGNMENT optimization, with no sorting of directory entries, and with VERIFICATION turned on.

In addition, you may also tell **OPTune** to place certain types of files first in the directories by using the "**/E**" option to specify a list of up to 8 different file extensions.

Example: "**OPTUNE C: /OP SNA /E COM EXE BAT**" on the command line or in a batch file will **O**ptimize drive **C** in **P**acked mode, **S**orting files by **N**ame in **A**scending order. However, all files with a "**COM**" extension will be listed first, followed by the "**EXE**" files, and then all the "**BAT**" files. Files with other extensions will be sorted last.

Note: The example above lists programs before any other files in your directories. This will enable your system to access your programs more quickly.

Check-Disk

Command: /C - Run **Check-Disk** on the drive, reporting any errors and summarizing the disk statistics

The basic format for **CHECK-DISK** is as follows:

OPTUNE [drive:] /C[option]

Options: **R** - Do **Report** only (default)
F - Do **Fix (and report)**

Example: "**OPTUNE C: /CF**" on the command line or in a batch file will Check drive **C** and report any errors, and will also **Fix** the errors that it encounters.

Verify/Fix Disk

Command: **/V** - Run **Verify/Fix-Disk** on the drive, fixing any errors automatically and reporting all errors on the screen only

The basic format for **VERIFY/FIX-DISK** is as follows:

OPTUNE [drive:] /V [type [mode]] [P] [D [drive]] [# cycles] [auto-mode] [-I]

Options:
Type: **0** - **Read-Only test** (default)
1 - Bit-Test 1
2 - Bit-Test 2
3 - Bit-Test 3

Mode:

Q - **Quick mode** (default)
S - **Safe mode**

P - **Send output to printer**
D[drive] - **Send output to disk file on drive indicated**
- **Number of cycles to perform**

Auto-mode options:

A - **Fix errors automatically** (default)
M - **Fix errors manually**

Example: "**OPTUNE D: /V P DG 20 A**" on the command line or in a batch file will **V**erify drive **D** sending the results to the **P**rinter and to the file "VERIFY.RPT" on **D**rive **G**. This verification will be performed in "Read-Only" mode, since no type was specified. The program will cycle through the verification process **20** times, and fix errors **A**utomatically,

Example: "**OPTUNE C: /V2 S 20**" on the command line or in a batch file will **V**erify drive **C** using the "Bit-Test **2**" type of disk verification in the "**S**afe" mode (which requires another floppy diskette), and will cycle through this verification **20** times.

Park

Command: **/P** - Park all physical hard disks attached to the computer

Options: None

Example: "**OPTUNE /P**" will park all drives.

Tune-Disk

Because of the extreme sensitivity of this function, and because it is used infrequently, the **Tune-Disk** function may only be accessed from the menu in the **OPTune** program.

Error-Level Codes

OPTune can inform DOS of the success of the commands that were executed. The batch-file "IF ERRORLEVEL X" command can be used to determine if **OPTune** was successful or if errors occurred while the program was running. The file **SAMPLE.BAT** on your master disk gives a detailed example of the power and flexibility of this "errorlevel" command.

OPTune sends the following "errorlevel" codes to DOS upon program termination:

0 - The function was successful
1 - There was an error in the disk's FAT or directories
2 - The specified drive was not available
3 - A bad cluster was detected (use **Verify/Fix-Disk** to solve this problem)
4 - There was not enough memory for this function
5 - The disk is not a standard hard disk (this applies to **Tune-Disk** only)
6 - A fatal error occurred
7 - There are not enough free clusters on the disk (delete one or more files and repeat the command)
8 - There may be unallocated clusters or **OPTune** detected a problem with the disk's directory structure (use **Check-Disk** to solve the problem)
10 - Disk caching was detected and should be deactivated before repeating the command
13 - The GAZELLE.SAV file was corrupted
26 - An invalid command was specified on the command line
27 - The user pressed **ESC** to terminate the program prematurely

USING OPTUNE IN BATCH FILES

Because **OPTune** is so fast, most users prefer to optimize their disks each time they turn their computers on. This section explains how to modify your **AUTOEXEC.BAT** file so that this is an automatic process.

From within any batch file you can tell **OPTune** to optimize, check, verify, or fix any drive. When you have determined which **OPTune** command(s) you wish to run, you are ready to modify your **AUTOEXEC.BAT** file.

OPTune must first be properly installed on a drive that your computer can access when it boots up. You will need a text editor on this drive (such as the one included with **Q-DOS**, another product from Gazelle Systems) to modify your **AUTOEXEC.BAT** file.

To modify your **AUTOEXEC.BAT** file, do the following:

1) Start your text editor, and tell it to read or load the file named "**AUTOEXEC.BAT**" (which should be in the root directory of your bootup drive).

2) Insert the appropriate **OPTune** command in the file. We recommend that the **OPTune** command be one of the first commands listed. (Consult the section in this manual entitled "Command-Line Parameters" for a listing of the commands.)

   For example, if you wish to have **OPTune** optimize drive C using normal optimization, add **C:\OPTUNE\OPTUNE C: /ON** to your batch file (using your editor), and press **RETURN** at the end of the line. (This assumes that **OPTune** exists in the **\OPTUNE** directory on drive C.)

3) Save the file using your editor's save command. The next time your disk boots up, it will run **OPTune** on drive C.

OPTune can only Optimize (or Check, or Verify) one drive at a time. If your computer system has multiple drives, you must use multiple **OPTune** commands (one specifically for each drive).

NOTE: If you do not have an **AUTOEXEC.BAT** file on your disk and would like to create one that runs **OPTune**, follow these instructions. (These instructions assume that drive C is your boot up disk and that **OPTune** has been installed on this drive. If this is not the case, then substitute the correct drive letter for C.)

1) From the DOS prompt, type **COPY CON C:\AUTOEXEC.BAT** and then press **RETURN**. Your DOS prompt will disappear and the cursor will appear at the left side of your screen. The things that you type in at this point will be placed in the **AUTOEXEC.BAT** file in the root directory of drive C.

2) Type **C:\OPTUNE\OPTUNE C: /ON** and press **RETURN**.

3) Type **Ctrl-Z** (hold the CTRL key, and press the "Z" key). Then, press **RETURN**.

4) DOS will indicate that one file was successfully copied. If it does not, then repeat this procedure.

BATCH FILES FOR POWER USERS

PLEASE NOTE: The batch-file commands in **SAMPLE.BAT** are intended to help advanced computer users get the most out of **OPTune**.

Advanced computer users may also want to study the "ERRORLEVEL" codes that **OPTune** returns (see the end of the "COMMAND-LINE PARAMETERS" section). These codes can be interrogated by the DOS "IF ERRORLEVEL X" command to know whether **OPTune** encountered any errors during any function initiated by a batch-file command.

For example, you may wish to setup a sequence of commands that will optimize your disk; and, if an error is encountered, you can use **OPTune**'s **Check-Disk** function to correct the problem, and then run **OPTune** again. You may wish to examine the contents of the batch file **SAMPLE.BAT** which is included on your master diskette.

REFERENCE

TUNE-DISK TECHNICAL INFORMATION

The following section contains more detailed explanations of some of the **OPTune** commands.

Tune-Disk ensures that your hard disk runs as efficiently as possible. This command performs two important functions:

1) It checks to make sure that the low-level format (interleave factor) is adjusted properly ("tuned") for your hard disk and microprocessor.

   Before you can use your hard disk, it has to go through a process known as **low-level formatting**. This function puts addresses (magnetic marks) on your hard disk. These marks enable your hard-disk controller to know where parts of your disk are. The low-level format creates a physical map of your hard disk (in cylinders, heads and sectors) that allows your computer to read from and write to your disk. By using this map, your computer is able to retrieve the information that you store.

   Almost all low-level format routines make several basic assumptions about your hard disk. One assumption that most of these routines make is that all systems are the same. These routines choose one of many possible formats (or interleave settings) for your hard disk. All of the formatting processes are equally reliable, but only one of them is right for your hard disk. If your computer is using the wrong format, it will still work. However, if your disk has been formatted with a "non-optimal" interleave, *the hard-disk controller may sometimes have to wait 3-5 times longer than necessary to access the data on the disk.* **Tune-Disk** will determine the best setting for your hard disk so that it is calibrated to match your system as closely as possible, making your computer run as fast and as efficiently as possible.

2) It strengthens the magnetic signals on your hard disk. Over time, the magnetic signals on a disk fade. As these signals fade, it becomes harder and harder for your computer to read them. After a period of time, weak magnetic signals will result in disk errors. **Tune-Disk** strengthens the magnetic signals on your hard-disk by reformatting the entire disk. After using **Tune-Disk** a few times, you may find that previously marginal parts of your disk become good again.

The Delay Index: Tune-Disk reports a **Delay Index** for each interleave tested. The **Delay Index** is simply the number of "clock ticks" it takes to complete the interleave check test (Each "clock tick" is approximately 1/145th of a second.) Lower index levels are better.

CHECK-DISK TECHNICAL INFORMATION

Check-Disk is the functional equivalent of the DOS "CHKDSK" program, but with two differences: it will work on **ANY** disk that DOS will recognize (regardless of disk or partition size), *and* it is up to 5 times faster than "CHKDSK".

Check-Disk performs a very thorough inspection of your disk. First it verifies that the vital areas of the disk are readable. Then, it makes sure that all directories are valid, directory entries (if not, **Check-Disk** will convert them to files).

Next, **Check-Disk** makes sure that each cluster on the disk is listed in the File Allocation Table (FAT) as either empty, used and valid, or "bad" ("bad" clusters are then blocked out so that DOS will not use them). Any invalid cluster is corrected. Then, each cluster is checked to make sure that it belongs to only one file; if it belongs to more than one file, **Check-Disk** will display a "cross-linked file" error message and indicate the files involved.

> **NOTE: Check-Disk** cannot correct cross-linked files by itself (see Appendix A and Appendix B for more information about cross-linked files). In the event that files on your disk become cross-linked, you must first copy them to another disk, then erase the original files and then run **Check-Disk** again. One or both of the cross-linked files will be bad. You must either delete them both or try to determine for yourself which file is good.

Check-Disk next makes sure that each file's size matches the FAT entries for that file, and adjusts the file size in cases where they do not match.

Next, **Check-Disk** sweeps up any unallocated clusters and attaches them to files (starting sequentially with "FILE0000.CHK") so that you can inspect them.

Check-Disk has two modes of operation. The **Report** mode completely analyzes the integrity of the DOS information and structure of your hard disk and reports any and all problems encountered. **Report**, however, does not actually correct any of these problems or make any changes to your disk.

The **Fix (and Report)** mode completes the same analysis as the **Report** mode. In addition to reporting errors and problems, **Fix (and Report)** corrects these errors so that DOS can again function properly on your disk.

If **Check-Disk** reports major problems on your disk, you should suspect that your computer has some hardware problems (your RAM could be going bad, the hard disk itself or its controller could be bad, etc.); a single power glitch could have caused the problem, or you could have turned off your computer before a program had a chance to close some files. You may have a program with bugs that is causing DOS to misbehave.

VERIFY/FIX-DISK TECHNICAL INFORMATION

This command allows you to do a **Read-Only** test of your hard disk, quickly identifying any parts that have gone bad and preventing DOS from using them. If a file happens to be using a marginal area on your hard disk, **Verify/Fix-Disk** will attempt to recover the data from this area, move it to a good area, and then block out the marginal area so DOS can no longer use it.

In addition, **Verify/Fix-Disk** will do a thorough test of each part of your disk, subjecting each sector to a vigorous multi-level "bit-pattern" test that will flush out every potentially bad sector. This bit-pattern testing will actually *predict which clusters are about to go bad and then prevent disk errors from occurring on those clusters!* (Because of this, we strongly recommend that you perform this bit-pattern test at least once each month.)

Because Verify/Fix-Disk is very thorough and generates a lot of information, we included a feature which allows you to send the verify report to a printer, to a disk file, or both. This makes it possible for you to initiate a complete verification of your disk at night and come back the next morning with a complete report of any problems encountered and any marginal areas blocked out.

There are 4 levels of testing that Verify/Fix-Disk can perform:

1) read-only testing (2-4 minutes on a 20 MB disk)

2) level 1 testing, which performs the read-only test and then a single proprietary worst-case bit-pattern test (30-50 minutes)

3) level 2 testing, which performs the read-only test and then tests 8 bit-pattern tests used by hard-disk manufacturers and 4 other proprietary tests (2-4 hours)

4) level 3, which performs the read-only test and then performs 16 bit-pattern tests used by hard-disk manufacturers and 8 other proprietary tests (3-6 hours–this is the most rigorous test that your controller can perform).

Each of these test levels can be executed from 1 to 99 times.

NOTE: Unlike other hard-disk test programs **OPTune** uses the same bit-pattern tests developed and used by hard-disk manufacturers to find defective secotrs. In addition, Gazelle has developed other priprietary tests which ensure that all defective parts of your disk are detected and blocked out.

APPENDICES

APPENDIX A–ERROR MESSAGES

OPTIMIZE

ERROR: "Bad cluster -- Use Verify/Fix"

Explanation The optimizer has encountered a cluster that it cannot successfully read. This error will interrupt the optimizer. If **Verify/Fix** is able to block out the bad cluster, the optimizer will run with no problems.

Suggested Action: Run **Verify/Fix-Disk** immediately.

ERROR: "Bad sector encountered in ROOT directory!"

Explanation: The optimizer encountered a bad sector in the ROOT directory area of the disk -- one which it could not successfully read. This is a fatal error for **OPTune**, and will cause serious problems for DOS.

Suggested Action: Back up all data on the drive. Then, either perform a low-level format of the disk (in an attempt to fix the bad areas) or repartition the disk so that the drive does not use the cylinder which has a defective sector. Another alternative is to replace or repair the hard disk.

"Drive was not available" ERROR:

Explanation: This error is reported if the optimizer is unable to read the boot sector of a valid logical DOS drive. It usually indicates that a removable drive was not available when **OPTune** tried to access it.

Suggested Action: Make sure that a disk or cartridge is inserted and that power is properly being supplied to the drive.

"Not enough free clusters" ERROR:

Explanation: There are not enough empty clusters on the drive being optimized for the optimizer to work correctly.

Suggested Action: Delete some unwanted files from the drive, and then run OPTune again.

"Please use Check-Disk first!" ERROR:

Explanation: The optimizer has detected an error in the DOS structure of the drive being optimized (either in the File Allocation Table (FAT) or in a directory entry).

Suggested Action: Run **Check-Disk** in its **Fix** mode. This function will give you a complete listing of the errors encountered and it will correct them, if possible.

TUNE-DISK

ERROR: "A fatal error occurred!"

Explanation: This error may be caused by one of two problems: 1) **Tune-Disk** was unable to alter the interleave of a particular track, or, 2) the drive being tuned did not support a standard IBM BIOS operation such as seek, reset, etc.

Suggested Action: Run **Verify/Fix-Disk** to see if an unmarked bad sector caused the error.

ERROR: "Error detected: Cyl #xxxx Head #xx"

Explanation: **Tune-Disk** has detected an error on a sector. This function will report whether the error might result in data loss.

Suggested Action: If **Tune-Disk** reports possible data loss, run **Verify/Fix-Disk.**

ERROR: "Not a standard hard drive"

Explanation: This error occurs most frequently when someone attempts to tune a floppy drive. If the specified drive is a hard drive, this error message will occur if the drive is non-standard. A non-standard drive has 1) a physical sector size greater than 512 bytes, 2) more than 64 heads per cylinder, or 3) more than 40 sectors per head.

Suggested Action: None. The drive you tried to tune cannot be tuned.

CHECK-DISK

"### clusters found in ### chains" ERROR:

Explanation: The File Allocation Table (FAT) indicates that there are clusters which contain valid data, but which do not belong to a valid file chain. This error means that at some point the FAT was not correctly updated.

Suggested Action: Run **Check-Disk** in **Fix** mode.

"Allocation error, size adjusted" ERROR:

Explanation: The specified size of a file does not match the number of clusters allocated for the file in the File Allocation Table (FAT).

Suggested Action: Run **Check-Disk** in **Fix** mode.

ERROR: "Cross-linked files --"

Explanation:	**Check-Disk** has discovered one or more clusters which the File Allocation Table (FAT) indicates are assigned to more than one file chain. This error is caused when (for whatever reason) the FAT is not correctly updated or becomes corrupted.
Suggested Action:	Copy the cross-linked files to another drive, and then erase the original files. Then run **Check-Disk** in **Fix** mode. When the problem is corrected, copy the files back on to the original drive (see the section on "Cross-Linked Files" in the Glossary).

ERROR: "Invalid subdirectory -- converted to a file."

Explanation:	**Check-Disk** found a directory entry whose current (.) pointer or parent (..) pointer was an invalid FAT entry. It then converted the directory entry into a file of size 0.

Suggested Action: Delete the file that **Check-Disk** created and then try to create the subdirectory again. If unallocated clusters are detected, they are most likely files that belonged to the defective directory. You should immediately inspect the FILEXXXX.CHK files that were created and rename them, remove them, or keep those that you need.

"Invalid first cluster in file -- truncated." ERROR:

Explanation: **Check-Disk** found a file with a first cluster entry that was an invalid FAT entry. The file was then truncated to a length of 0.

Suggested Action: If the file was backed up, delete the truncated file entry, and then restore the file.

"Invalid cluster (###) in FAT -- truncated." ERROR:

Explanation: **Check-Disk** found an illegal entry in the File Allocation Table (FAT) and truncated the file chain that the entry belonged to at that point.

Suggested Action: The truncated portion of the file may either be located and restored manually (by someone with sufficient technical background). If the file was backed up it can be completely restored.

ERROR: "Root directory is full -- unable to create .CHK files"

Explanation: When **Check-Disk** is run in its **Fix** mode, it will convert any lost file chains it encounters into files. These files will have the extension .CHK, and will be written to the root directory of the current drive. If the root directory is full, **Check-Disk** will be unable to create any more .CHK files.

Suggested Action: Delete any unneeded files from the root directory, or move them temporarily to another directory. Then, run **Check-Disk** in **Fix** mode again.

VERIFY/FIX-DISK

ERROR: "Bad cluster encountered... -- couldn't find it!"

Explanation: When doing a **Read-Only** verify, **OPTune** reads several clusters at a time. If an error is detected, **Verify/Fix-Disk** will re-read each cluster in order to determine which cluster caused the error. If the error is not repeated, **OPTune** will be unable to block out the bad cluster.

Suggested Action: Repeat the **Read-Only** test several times, or run **Verify/Fix-Disk** in one of its bit-pattern testing modes to catch the error.

"Can't send output file to same disk." ERROR:

Explanation: **Verify/Fix-Disk** will not allow its report file to be written to the same drive that is being verified. While the report file is open (which is for the duration of the verify operation), the area of the disk occupied by the report file cannot be read or altered, and therefore cannot be verified.

Suggested Action: Select a different destination drive for the output file.

"Cluster ### is bad, not blocked out--" ERROR:

Explanation: **Verify/Fix-Disk** has discovered a bad cluster which has not been marked as such in the File Allocation Table (FAT). If the "Auto-Fix" option is active, **OPTune** will automatically mark the bad cluster in the FAT. Otherwise, it will prompt the user for confirmation before marking the bad cluster in the FAT.

Suggested Action: If **Verify/Fix** is not in "auto fix" mode, respond to the prompt.

ERROR: “Error in FAT or directories”

Explanation: **Verify/Fix-Disk** has discovered a bad sector in the FAT area of the disk or in a directory cluster.

Suggested Action: Back up the drive and try to reformat it. If that does not solve the problem, contact Gazelle systems for further help.

ERROR: “Error while creating VERIFY.RPT”

Explanation: **Verify/Fix-Disk** was unable to create a report file on the specified drive. This error will occur if 1) the destination drive is full, 2) the root directory of the destination drive is full, or 3) there are one or more bad sectors on the destination drive.

Suggested Action: Try deleting any unwanted files on the destination drive. You can also select a different destination drive. Or, if you specified a floppy drive, you can try a different floppy diskette.

ERROR: "No empty clusters available - not fixed!"

Explanation: **Verify/Fix-Disk** was unable to move a cluster of data from a bad area to a good area because there were no available empty clusters.

Suggested Action: Delete some unneeded files from the drive, and then run **Verify/Fix-Disk** again.

"Too many errors -- try again?" ERROR:

Explanation: **Verify/Fix-Disk** was unable to move data from a bad cluster to a good one because the data was too badly damaged. However, if the user wishes, **Verify/Fix-Disk** will make another attempt to move the data.

Suggested Action: In response to the prompt, press "Y" to try again. If the cluster is still too badly damaged, use the DOS "COPY" command to copy the files to another disk. When the "Abort, Retry, Ignore?" message appears, instruct DOS to Ignore the error. Then, erase the original files. Run **Verify/Fix-Disk** again to block out the bad sector.

It is likely that part of your data will have been lost due to your disk's bad sector.

APPENDIX B–GLOSSARY

Cluster

A cluster is the smallest unit of disk storage that DOS recognizes. On a 20 MB hard disk, a cluster is usually exactly equal to 2,048 bytes.

In DOS, each file is made up of one or more clusters. Even the smallest files, such as a batch file that is only 30 bytes long, require at least one full cluster. As the size of a file increases, DOS will allocate clusters one-at-a-time for the file's expansion. A disk runs out of disk space when there are no more available clusters for expanding files.

Each cluster is either available (empty), bad (blocked out), or used (i.e., a file or subdirectory owns it). A cluster can belong to one file only. If DOS thinks that a cluster belongs to more than one file, your disk has a **cross-linked cluster**.

One way to determine your disk's cluster size is to run the **Check-Disk** command and write down the number of bytes available on disk. Next, create a very small file and then run the **Check-Disk** command again. Subtract the number of bytes that are now available on disk from the first number - the result is the cluster size of the disk.

Cross-linked cluster

A **cross-linked cluster** occurs when DOS accidentally assigns a cluster to more than one file (usually because of a power glitch, a serious DOS disk error, or an errant program destroying critical DOS information). Since a cluster can be owned by only one file or one subdirectory, this is a DOS error that must be fixed. The **Check-Disk** command will indicate if you have any cross-linked clusters.

The only way to correct the problem is to copy the offending files (there can sometimes be more than two files cross linked on the same cluster) to another disk and erase the original files. Then, use the **Fix** option of the **Check-Disk** command to clean up the disk.

The copies of the files you made *may be corrupted.* When a cross-link situation arises, it is usually too late to recover all the data from the cross-linked files; however, most of the time at least one of the cross-linked files will be intact. In any event, you should consider using your backup program to restore your most-recent copy of any cross-linked file that was critical to you.

Cylinder

The cylinder is simply the name of the largest physical unit of storage on a disk. A hard disk is composed of numerous "cylinders" (sometimes also referred to as"Tracks"). A hard disk can have 600 or more cylinders.

Cylinders are actually concentric circles on the disk. Imagine a circular platter with a small circle around the very center, and a slightly larger circle around that small one, and a slightly larger circle around that one, and so on, until you get to the outer edge of the platter; each of these circles would be a cylinder.

Delay Index

Tune-Disk reports a **Delay Index** for each interleave tested. The **Delay Index** is simply the number of "clock ticks" it takes to complete the interleave-check test (each "clock tick" is approximately 1/145th of a second.)

Defragmentation

When DOS stores a file, it will often store the file in pieces that are scattered all over a disk. This is because DOS does not try to put the file into one physical location on the disk, but merely finds the "nearest empty space" and fills it. **Defragmentation** is the process of combining these file fragments into one contiguous piece.

Defragmentation can greatly decrease the amount of time it takes the disk controller to read parts of a file. Since a defragmented file is in one sequential chunk, DOS only has to look for the file in one place. This reduces the required movements of the hard disk's read/write-head mechanism. Because the most time-consuming operation on a hard disk is moving the read/write heads to the correct position on the disk, anything that reduces that time will make a big difference in your disk's data-transfer rate. Reduced head movement also means reduced wear-and-tear on your disk.

DOS optimization

DOS keeps directory information in different places on each of your disks. To find a file or directory, DOS has to start at the root directory, and search for the directory or file it has been asked to find.

There are two ways to optimize DOS: either put all this directory information as close together as possible (so that very little time is spent figuring out where to look for the next bit of information); or, sort all the directory entries so that all the subdirectories are listed first. This will save DOS tremendous amounts of search time.

OPTune uses both of these methods. The end result is that DOS searches through fewer directory entries. In addition, since all directories are listed at the front of the disk, where it is most efficient for DOS to find them, very little time is wasted in moving the disk's read/write heads when DOS needs to find another directory entry.

File-Allocation Table (FAT)

This is one of the most critical parts of your hard disk. In fact, because it is so important, DOS almost always keeps two copies of the disk's FAT on each disk (some disks can be created that have more than two copies).

The FAT is a map of the space occupied by the files and subdirectories on your disk. It contains one entry for each cluster on the disk. When DOS creates a new file, it searches the FAT to find unused clusters, and then assigns these clusters to the new file.

When DOS erases a file, it makes a small change in the file's directory entry and then follows the file's cluster chain in the FAT, changing each entry to 0 to indicate that each of these clusters are now available for any other file.

Fragmentation

This is the naturally occurring process in DOS whereby files on your disk are assigned to 2 or more sections of a disk, rather than one contiguous "chunk". Fragmentation occurs when files are erased and then larger files are created and then placed on the disk. When creating (or extending) a file, DOS will simply start searching for available clusters at the beginning of the FAT. If there are not enough contiguous free clusters to hold a file, DOS will store the file in pieces on unused clusters as they are available.

> **NOTE:** DOS version 3.0 and higher will remember where it last found an unused cluster. It will begin storing data at that spot, rather than starting its search for free clusters at the beginning of the disk. This process helps reduce file fragmentation, especially on disks that are less than half full.

Head

A **head** is simply a side of a cylinder. Normally, each cylinder has two sides, or heads. Some disks only store data on one side of each cylinder; these are referred to as "single-sided" disks.

Other disks can actually have more than two heads: the disk manufacturer simply includes extra hard-disk platters in the hard-disk system (each platter has two heads associated with it).

Interleave

The term **interleave** refers to a process used when formatting a hard disk. The interleave is simply a measure of how sectors are physically arranged on a hard disk. On a disk with an interleave of 1:1 ("one to one"), sector two starts exactly one sector's width after the start of sector one. On a disk with an interleave of 4:1 sector two starts exactly 4 times the width of one sector after the start of sector one. Each subsequent sector on the disk follows this logic. (On disks, the sectors do not have to be numbered in sequential order – often, disks are more efficient if they are numbered in sequential order.)

The process of interleaving sectors on a hard disk was established due to the fact that most hard disks spin extremely fast (60 times per second), and the data-transfer rate of most hard-disk controllers is not high enough to handle this rapid rotational speed.

The controller can, however, buffer one sector's worth of data and process it (with the disk spinning constantly), and then come back for another sector. But, with the high rotational speed of the hard disk, the disk might spin 1/4 to 1/3 of a revolution before the controller is ready to read the next sector, which means that 4 to 6 sectors just passed by (assuming that there are 17 sectors per cylinder).

The interleaving process staggers the sector-numbering scheme so that the appropriate sector comes into contact with the read/write heads at the precise moment that the controller is ready to read data. Interleaving the sectors on a disk reduces processing time: there are no long waits for the disk to spin around a full revolution because it just missed the sector it was waiting for.

Sector

A sector is the smallest unit of disk storage that can be accessed directly on a hard disk. However, DOS keeps track of clusters, not sectors, since clusters usually consist of multiple sectors. This means that DOS has fewer "building blocks" to keep track of.

The word “sector” actually has two definitions which can make its use somewhat confusing. First of all, DOS uses the term to define a “logical” chunk of disk space, which consists of one or more “physical” sectors on the hard disk. Here is how this logical/physical usage evolved:

In the beginning days of computers, no one ever expected a computer's hard disk to contain more than 5 to 10 megabytes of data. So, to be very liberal, the creators of DOS designed a maximum limit of 32 megabytes of disk space, which would handle a disk with up to 65,536 sectors (each sector has 512 bytes).

As we have recently seen, this 32 megabyte limit has been far exceeded by drives with 120 MB and greater capacities. However, the original limitation (of only 65,536 sectors) could not be changed without a major restructuring of DOS.

So, some pioneering souls hit upon a very simple solution: "What if we decided to say that a sector was really 1024 bytes, or 2048 bytes – then, we could still respect the built-in limit of DOS's 65,536 sectors and yet support disks of 64 megabytes, 128 megabytes, and larger!"

As a result, sectors were redefined as being 512, 1024, 2048, 4096, etc., bytes in length so that larger disks could work with DOS.

In the meantime, however, the hard-disk manufacturers remained true to the original definition of a sector – "sectors have 512 bytes."

Thus, the manufacturers' definition came to be known as the "physical" sector, since the actual, physical hard disk is divided into 512-byte chunks; and, the definition of sector in DOS came to be known as the "logical" sector.

Track

See **Cylinder.**

Unallocated clusters

Every so often **Check-Disk** will find and report unallocated (or "lost") clusters on your disk. In almost every situation, this does not represent any problem at all and you should simply allow **Check-Disk** to take care of these clusters.

Unallocated clusters are generally created either because a program did not properly close a temporary file, or because the computer was rebooted or turned off while in the middle of a program that had one or more "open" files. These unallocated clusters contain the data that the program had written to the disk; but, because the file being written to was not "closed," DOS can not tell what file these clusters are part of.

When the **Fix and Report** option of **Check-Disk** cleans up unallocated clusters, it creates a series of files in your root directory and attaches these clusters to those files. These files are named "FILE0000.CHK", and are numbered sequentially.

APPENDIX C–INDEX

AUTOEXEC.BAT 61
Bit-Test 47
Check-Disk 41, 66
    Fix 43, 67
    Report Only 43
Cluster 80
Color 20
Command Line 22
Command-Line Parameters 54
Computer 1
Copy-protected software 18
Cross-linked cluster 80
Cross-linked files 74
Cylinder 81
Defragmentation 10, 82
Delay Index 81
Disk caching 16, 17, 54
Documentation 1
DOS Optimization 10, 82
Error Messages 70
Error-Level Codes 60
Escape 23
Features 13
File-Allocation Table (FAT) 83
Fix 43, 67
Glossary 80
Head 84
Help 24
Installation 19
Interleave 84

License Agreement 1
  Definition Of Terms 1
  Disclaimer Of Liability 3
  Grant Of License 1
  Software Copies 2
  Source Code 3
  Transfer Of Software 2
  Licensee 1
  Limitations 15
Limited Warranty 4
  Other Conditions 7
  Warranty Period 4
  What Gazelle Will Do 4
  What Gazelle Will NOT Do 5
  What Is Covered 4
  What Licensee Must Do 6
Low-level format 64
Materials 8
Memory requirements 9
Network 15
Novell disk server 15
Number of times to verify 49
OPCOLOR 20
OPSTART.EXE 19
Optimize 27
  File Realignment 33
  Normal 32
  Packed 32
OPTUNE.EXE 8
Park 52

Quick mode 37
Quit 52
  Park 52
Read-Only 47
RECOVER.EXE 8, 36
Report Only 43
Report to disk 50
Report to printer 49
Safe mode 37
Safety Tips 18
Sector 85
Simulation Mode 31
Software 1
Sort Direction 30
Sort Directories 30
Sort on Field 30
Starting point 38
System Requirements 9
Technical Information 64
Track 86
Tune-Disk 34, 64
  Quick 37
  Safe 37
  Starting point 38
  Test 39
U.P.S. System 18
Unallocated clusters 86
Verification 31
Verification Mode 48
  Bit-Test 47
  Read-Only 47

Verify/Fix-Disk 45, 68
  Fix errors automatically 49
  Number of times to verify 49
  Report to disk 49
  Report to printer 49
  Verification Mode 48

THE WINNING TEAM OF HARD-DISK UTILITIES

Q-DOS 3 is Gazelle's blazingly fast file manager. This powerful, versatile, easy-to-use utility takes the hassle out of working with DOS and your hard disk.

Back-It is a high-performance hard-disk backup utility. It enables you to backup your hard disk with maximum speed, flexibility, safety and ease. **Bernoulli Back-It** is Gazelle's fast, reliable backup utility for use with removable cartridge systems.

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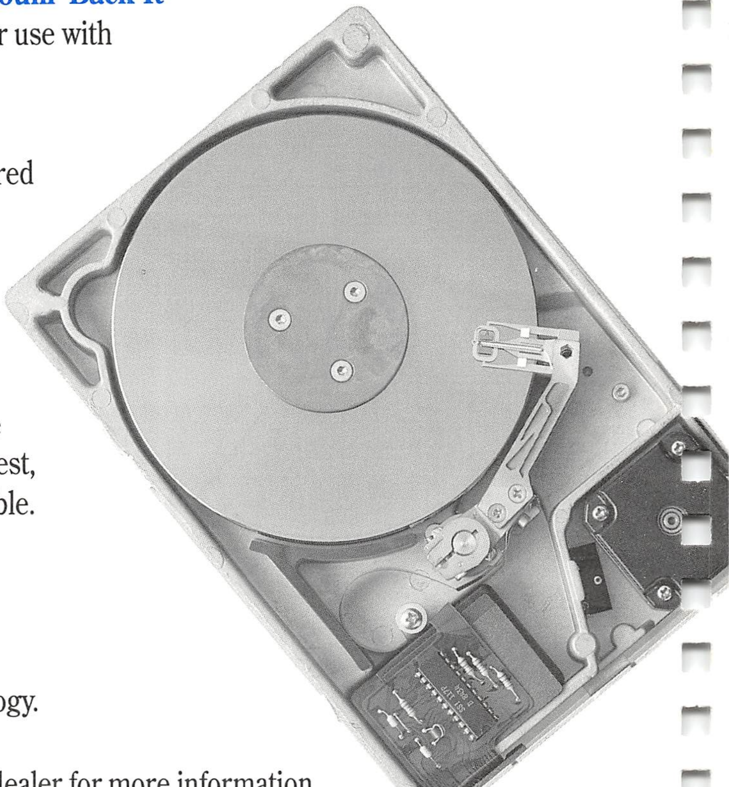
OPTune is Gazelle's all-in-one hard-disk optimization and maintenance utility. This program offers you the fastest, safest, most thorough optimization available.



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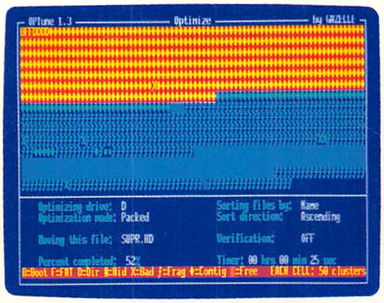
The First "All-In-One" Hard Disk Survival, Repair, and Tune-up Maintenance Utility.



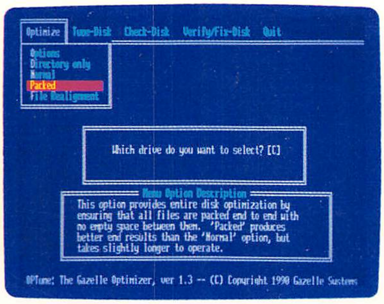
```
OPTune 1.3 ———————— Optimize ———————— by GAZELLE

Optimizing drive:      D          Sorting files by:  Name
Optimization mode:     Packed     Sort direction:    Ascending

Moving this file:      SUPR.HD    Verification:      OFF

Percent completed:     52%        Timer: 00 hrs 00 min 25 sec
B:Boot F:FAT D:Dir #:Hid X:Bad ƒ:Frag ♦:Contig ▒:Free   EACH CELL: 50 clusters
```

OPTune graphically displays the progress of your optimization.



```
Which drive do you want to select? [C]

Menu Option Description
This option provides entire disk optimization by
ensuring that all files are packed end to end with
no empty space between them.  'Packed' produces
better end results than the 'Normal' option, but
takes slightly longer to operate.

OPTune: The Gazelle Optimizer, ver 1.3 -- (C) Copyright 1990 Gazelle Systems
```

OPTune is the only hard-disk utility that offers all phases of disk optimization.

It's gradual. Hard-disk slowdown is so gradual that you may not notice it until you find yourself waiting every time you try to access your files. And the more you use your hard disk, the slower it gets.

That's why it's so important to have a hard-disk utility that will help your system operate at its peak performance level. A utility that will speed up your hard disk *and* improve its reliability. That utility is OPTune.

Here's what OPTune has to offer:

Increased productivity. OPTune increases the efficiency of your hard disk, so that it will respond at maximum speed—*up to four times faster than before.*

Extended disk life. More efficient disk operation means less wear-and-tear on your hard disk. This means that your hard disk will not only be quicker, it will also last longer.

Hard disk verification/repair. OPTune verifies the integrity of every sector of your hard disk. It finds the marginal areas of your disk and blocks them out, preventing DOS from storing your valuable data on potentially unsafe media. OPTune also strengthens the magnetic signals on your disk, preventing other areas from becoming marginal.

File protection. OPTune moves data stored on marginal areas of a hard disk to areas that are reliable. This will prevent data loss due to damaged files.

Crash prevention. OPTune can actually predict and prevent hard-disk failures. Over time, DOS's picture of your hard disk becomes outdated due to changes resulting from normal wear-and-tear. OPTune updates this picture, thereby preventing disaster.

Safe operation. OPTune spends much less time manipulating sensitive areas of your disk than any competing product. And, OPTune's Check-Disk and Verify/Fix-Disk features ensure that your data is safely stored.

Benefits of Using OPTune

Comprehensive optimization— OPTune is the only product of its kind that offers all phases of disk optimization, including DOS optimization, file defragmentation, and permanent tuning of your hard disk.

*Speed—*OPTune offers the fastest defragmentation and DOS optimization available—up to 10 times faster than other optimizers on the market today.

*Safety—*OPTune's built-in Check-Disk and Verify/Fix-Disk functions ensure that your disk is reliable and safe. OPTune checks for bad or marginal sectors on your hard disk and blocks them out, repairing any damaged files, if necessary.

*Flexibility—*OPTune can handle unusual disk formats, including disks created using special partitioning schemes. OPTune will work with *any size* disk or DOS partition.

Hardware

IBM,® PC,™ XT,™ AT,™ PS/2™ or compatible using MS-DOS or PC-DOS version 2.0 or higher.

Minimum system requirement: 256K recommended.

Money-Back Guarantee

If, for any reason, you are not completely satisfied with OPTune, call us within 60 days from the date of purchase and we will arrange for a prompt refund.

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GAZELLE

OPTUNE ERRATA

(REVISED 12/11/90)

It is extremely important that you read this addendum to your OPTune manual! It contains vital information and a few cautions that you must be aware of in order to get the most effective optimization possible. In addition, it also documents a few new features that were added to OPTune after the manual was printed.

SAVING YOUR CONFIGURATION

You can save your settings within OPTune to a configuration file. All settings with the exception of beginning and ending cluster number and beginning track number may be saved by selecting **Save Configuration** from the **Quit** pull-down menu.

The configurations you save become the default settings when you run OPTune subsequent times after saving. The settings are saved to a file named OPTUNE.CFG. This file will be placed in the directory contained in the DOS environment variable OPTUNE. To set the environment variable, place the following in your AUTOEXEC.BAT file:

```
SET OPTUNE = path_name
```

where **path_name** contains the full path to the directory (including drive letter).

If you run OPTune using command line parameters, i.e., without user interaction, the configuration file OPTUNE.CFG will be used if you include the – C switch on the command line. If you omit the – C switch, the standard OPTune program defaults will be used. For example, to optimize drive C in packed mode, setting all other parameters from the configuration last saved, you would enter the following from the command line:

```
OPTUNE -C C: /OP
```

If the configuration file OPTUNE.CFG is found to contain information not associated with OPTune, i.e., the file is corrupted, it will be renamed to OPTUNE.CRP.

MICROSOFT WINDOWS 3.0 SUPPORT

Two new files OPT286.PIF and OPT386.PIF are included on the release disk which allow you to run OPTune under Microsoft Windows 3.0. Follow these steps to use OPTune under Windows:

1. Copy the PIF-file you need to your windows directory. Use either 286 or 386 depending upon your configuration. Rename this file to OPTUNE.PIF.
2. Run windows and choose **File** followed by **New.**
3. Select the PIF-file you renamed and give it an ICON.
4. Click on this ICON when you are ready to run OPTune from within windows.

FILE PLACEMENT

This release of OPTune allows you to place certain files or directories first on the disk. To do this, choose **File Realignment** and set **Specify Order** in the Options menu to **On**. You may also select file placement by using the O switch following the /O /S or /Z switches on the command line (e.g., OPTUNE C: /OO or OPTUNE D: /SO). The list of files to be placed first on the drive must have the name of each file in a text file (ASCII) named:

OP_ORDER.v

where v is the volume letter (e.g., C, F, etc.). The file names listed must contain the full path to the file beginning with the back-slash (\) character. You may use DOS wild-card characters, e.g., * and ?, to specify matching files. Each OP_ORDER file must be in the path set in the DOS Environment Variable OPTUNE (see previous section). For example, if you want the files ASM.EXE in subdirectory ASSEMBLY, and TABLE.DAT in the ROOT directory located first on your D drive, you would create the file OP_ORDER.D containing the following:

```
\assembly\asm.exe
\table.dat
```

Each file name must be terminated with a carriage-return (ENTER key). You may use any editor that creates an ASCII Text file as output to create the OP_ORDER file (or use the program OPBUILD described below). We suggest that you use the text editor that is provided with Q-DOS II.

No error message is reported if the OP_ORDER file is not found or if the file paths in the OP_ORDER file are incorrect. If you DO NOT want any specific files moved to the front of the disk, do not create an OP_ORDER file for that volume.

NOTE: Hidden files will not be moved by file realignment, so do not specify hidden files in the OP_ORDER file. Also, a file may be moved to the front of the disk by OPTune but may still appear in its directory as other than the first file.

The program OPBUILD has been provided to assist you in building the file OP_ORDER. OPBUILD will build a list of either files or directories that exist on a volume. The syntax is:

```
OPBUILD v: /option
```

where v is the volume you want to build the list for and option is either **D** or **F**. If you select **F** as the option, a list of file names on the volume will be built. If you select **D** (the default), a list of directory names will be build. For example: the command `OPBUILD D: /F` will create the file OP_ORDER.D containing a list of file names on volume **D**. The command OPBUILD G: will create the file OP_ORDER.G containing a list of directories on volume G.

MOUSE SUPPORT

You may use your Logitech or Microsoft compatible mouse with OPTune.

Using a mouse when running OPTune - You may move through menu selections in OPTune by moving the mouse either right and left, or up and down. The buttons on the mouse have the following functions:

Button	Simulates Keyboard Character
Left (both types of mice)	Return or Enter Key
Right (both types of mice)	Space Bar (Toggle Function)
Both Buttons (Microsoft)	Escape
Left and Right Buttons (Logitech)	Escape

OPTIMIZE DIRECTORY ONLY

You may now specify that only the directories on the volume will be optimized. The directories will be relocated to the front of the volume and will be made contiguous.

To specify from the user interface that you want this option, select the **Directory Only** option from the **Optimize** menu selection.

To specify the **Optimize Directory Only** option from the command line parameters, run OPTune with the /OD switch. For example,

```
OPTUNE C: /OD
```

will optimize the directories only on drive C.

GZ_SAVE and GZ_UNFMT

GZ_SAVE.EXE can help to protect you in case your hard disk is ever formatted accidentally. It will create a copy of your hard disk's critical DOS information in a hidden file called GAZELLE_.SAV. This file can be used later to restore your drive to its original condition, even after the DOS FORMAT command has been used.

This version of OPTune provides a means to run GZ_SAVE from the installation program OPSTART. You will be asked if you want to run GZ_SAVE for each volume on your system.

NOTE: It is only necessary to run GZ_SAVE program once since the hidden file it creates will be updated each time you run OPTune's Optimize function. Installing OPTune in your AUTOEXEC.BAT file is an excellent way to keep your GAZELLE_.SAV file current.

GZ_UNFMT.EXE will use the hidden file created by GZ_SAVE to reconstruct your drive after the accidental usage of the DOS FORMAT command. GZ_UNFMT will always be able to locate GAZELLE_.SAV even though DOS will not. NOTE: GZ_UNFMT should only be run after the inadvertent use of the DOS FORMAT command. Improper use of GZ_UNFMT can result in data loss.

SOFTWARE INCOMPATIBILITIES

1) Users of Q-DOS II should be aware that if OPTune is executed from within Q–DOS, the FAT and directory information maintained in memory by Q-DOS will no longer be correct It will then be necessary to rescan all drives which were optimized in order to update that information. The most recent releases of Q-DOS II (dated 08-15-89 and after) will detect OPTune, and automatically rescan the optimized drives. Any user who would like to obtain the latest release of Q-DOS II may contact our customer service department at (800) 233-0383, or (801) 377-1288 in Utah (a minimal product update fee may apply).

2) Because of the nature of the OPTune program, you must not use it when any multi-tasking or multi-user software is active. If any other program accesses the hard disk at the same time as OPTune, chances are very high that the system will lock up, and data will be destroyed. If you wish to run OPTune from an AUTOEXEC.BAT file, we recommend that it be listed as one of the first commands in order to reduce the chances that another program might interfere with the optimization process. In particular, we strongly recommend that OPTune be executed before the DOS FASTOPEN program since FASTOPEN can cause serious data damage if it does not have correct information about the location of files on your hard disk. If OPTune detects that FASTOPEN is already in memory, it will force a system reboot after the optimization process is completed. This will protect your data from

FASTOPEN, but will also make running OPTune in your AUTOEXEC.BAT file somewhat inconvenient.

3) Do not use OPTune if you have any disk caching software active. Many disk caching programs can intercept critical disk accesses and prevent them from occurring. In order to avoid the serious problems that this can cause, OPTune will test for disk caching, and abort its current function with an appropriate error message, if caching is detected. Unfortunately, OPTune will sometimes report that caching is active even when there is no software caching installed. This means that your system has some type of hardware disk cache, and you will need to include a '– I' (for example, at the command line you would type "OPTUNE – I") command-line option when you run OPTune. This option will simply cause OPTune to ignore the hardware disk caching since it will not cause the same problems that many software caches can cause.

4) Many copy-protected software packages use special hidden and/or system files to detect unauthorized duplication. If any of the hidden/system files are moved to another location on the disk, the copy-protected software may not function properly. In order to avoid this problem, OPTune identifies all hidden/system clusters on your hard drive, and does not move them. Unfortunately, some copy-protected software packages use more sophisticated methods to prevent unauthorized duplication. For this reason, it is possible that some copy-protected programs will no longer run after OPTune's Optimize function has been executed. This problem can sometimes be avoided by marking the copy-protected software as hidden or system before using the Optimize command. Call Gazelle Systems for more information on how to do this.

5) OPTune 1.3 will work on any hard disk that has been formatted for use under DOS versions 2.0 and higher. However, it will not work on a Novell file server because the Novell software requires a proprietary disk format which is not DOS compatible. Fortunately, OPTune can be used to optimize the file server of most other networks as long as the network is not active.

TUNE-DISK CONSIDERATIONS

1) Before testing or altering the interleave of your hard disk, **Tune-Disk** will check to see if your system has a Konan disk controller installed. If a Konan controller is detected, the **Tune-Disk** function will abort and display a message that your hard disk controller is not standard. This is due to the fact that the Konan KXP-230Z controller performs many nonstandard functions that interfere with OPTune's operation, and will frequently result in data damage. If you are using a Konan

controller, and you are certain that it is not the KXP-230Z, you may include a '– R' command-line option which will allow the **Tune-Disk** function to operate normally.

2) Plus Development Corporation manufactures a variety of hard cards which may or may not be compatible with **Tune-Disk**. If you are using a Plus hard card which is not compatible, it will display an unpleasant error message when **Tune-Disk** attempts to alter its interleave, lock up your system, and force you to reboot. Although **Tune-Disk** will be unable to operate normally on these hard cards, it will in no way endanger any data on them.

3) Some of the hard drive controllers which were manufactured by Data Technology Corporation in 1983 and 1984 use a nonstandard disk format which is not compatible with the **Tune-Disk** function. If you are using a DTC controller that **Tune-Disk** recognizes, it will abort and display an appropriate error message. However, if you know that your system is using a DTC controller, we strongly recommend that you do a full backup before using the **Tune-Disk** function. If your particular DTC controller is not recognized by **Tune-Disk**, severe data damage will result.

4) The micro-channel PS/2 computers released by IBM after April, 1988, do not allow user programs to change their interleave setting. Therefore, the **Tune-Disk** function will abort with an error message if you attempt to run it on one of these machines. This is not a serious problem since these high performance machines are always set to the correct interleave.

5) The **Tune-Disk** function will work flawlessly on a wide variety of RLL controllers, but there are several others which will cause **Tune-Disk** to abort with a nonstandard controller message. Those RLL controllers which are not compatible with **Tune-Disk** operate in what is referred to as "translation" mode. This means the controller reports hard-disk parameters to the system ROM BIOS which are not correct in order to make its nonstandard drive format appear to be standard. If **Tune-Disk** detects that a controller is operating in translation mode, it will abort in order to prevent the severe data damage that could result. If you are using a translating RLL controller, we recommend that you contact its manufacturer to see if it can be reconfigured to operate in non-translation mode.

NOTE: If you wish to test and/or alter the interleave setting on a hard disk that is connected to a translating RLL controller, you may do so by including a '– R' command-line option when you execute OPTune. Be aware, however, that this will probably destroy all data on the drive!

6) Hard disk drives that contain more than 1024 cylinders are usually not compatible with the **Tune-Disk** feature since an IBM-compatible ROM BIOS will only support a maximum of 1024 cylinders. In order for these large drives to operate correctly, they must be controlled either by a "translating" controller, or by a proprietary device driver. If the former method is used, **Tune-Disk** will abort with an error message as it does with translating RLL controllers. If the latter method is used, **Tune-Disk** may be able to function normally, but it will only be able to tune the first 1024 cylinders on the drive.

7) Some high-performance hard-disk drives and removable-cartridge drives operate with high-speed controllers which perform SCSI data transfers. Since the SCSI data transfer method is not supported by an IBM standard BIOS, these devices must be controlled by proprietary device drivers. This means that the **Tune-Disk** function cannot communicate with them correctly, and a nonstandard drive message will result.

8) If your computer system has a switchable bus speed, we recommend that you set it to the slowest setting before using **Tune-Disk**. Many hard-disk controllers do not operate correctly at bus speeds greater than 8 MHz.
NOTE: We would like to express our appreciation to Perstor Systems, Inc. and Scientific Micro Systems, Inc. for their assistance in making the **Tune-Disk** function of OPTune 1.3 compatible with Perstor and Omti hard disk controllers!

ADDITIONAL FEATURES

1) The **Verify/Fix-Disk** function of OPTune includes an undocumented cluster range option. This option allows you to restrict the verification process to a specific area on your hard disk. If any other OPTune function detects a problem area on your disk, it will report a cluster-range which you may use later to do extensive bit pattern testing of that particular area.

   NOTE: This option may also be invoked from the DOS command line by including the SC (start cluster) and/or EC (end cluster) switches. For example, the command

```
OPTUNE C: /V 10 SC100 EC400
```

   would cause OPTune to perform 10 iterations of read-only verification on drive C: starting with cluster 100 and ending with cluster 400.

2) GZ_SAVE.EXE can help to protect you in case your hard disk is ever formatted accidentally. It will create a copy of your hard disk's critical DOS information in a hidden file called GAZELLE_.SAV. This file can be

used later to restore your drive to its original condition, even after the DOS FORMAT command has been used.

NOTE: It is only necessary to run the GZ_SAVE program once since the hidden file it creates will be updated each time you run OPTune's **Optimize** function. Installing OPTune in your AUTOEXEC.BAT file is an excellent way to keep your GAZELLE_.SAV file current.

3) GZ_UNFMT.EXE will use the hidden file created by GZ_SAVE to reconstruct your drive after the accidental usage of the DOS FORMAT command. It will always be able to locate GAZELLE_.SAV even though DOS will not.

NOTE: GZ_UNFMT should only be run after the inadvertent use of the DOS FORMAT command. Improper use of GZ_UNFMT can result in data loss.

GAZELLE

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